MARCH 1959

In this issue: over 40 reports of technical developments in plant and power services

POWER
PLANT & POWER SERVICES INDUSTRY

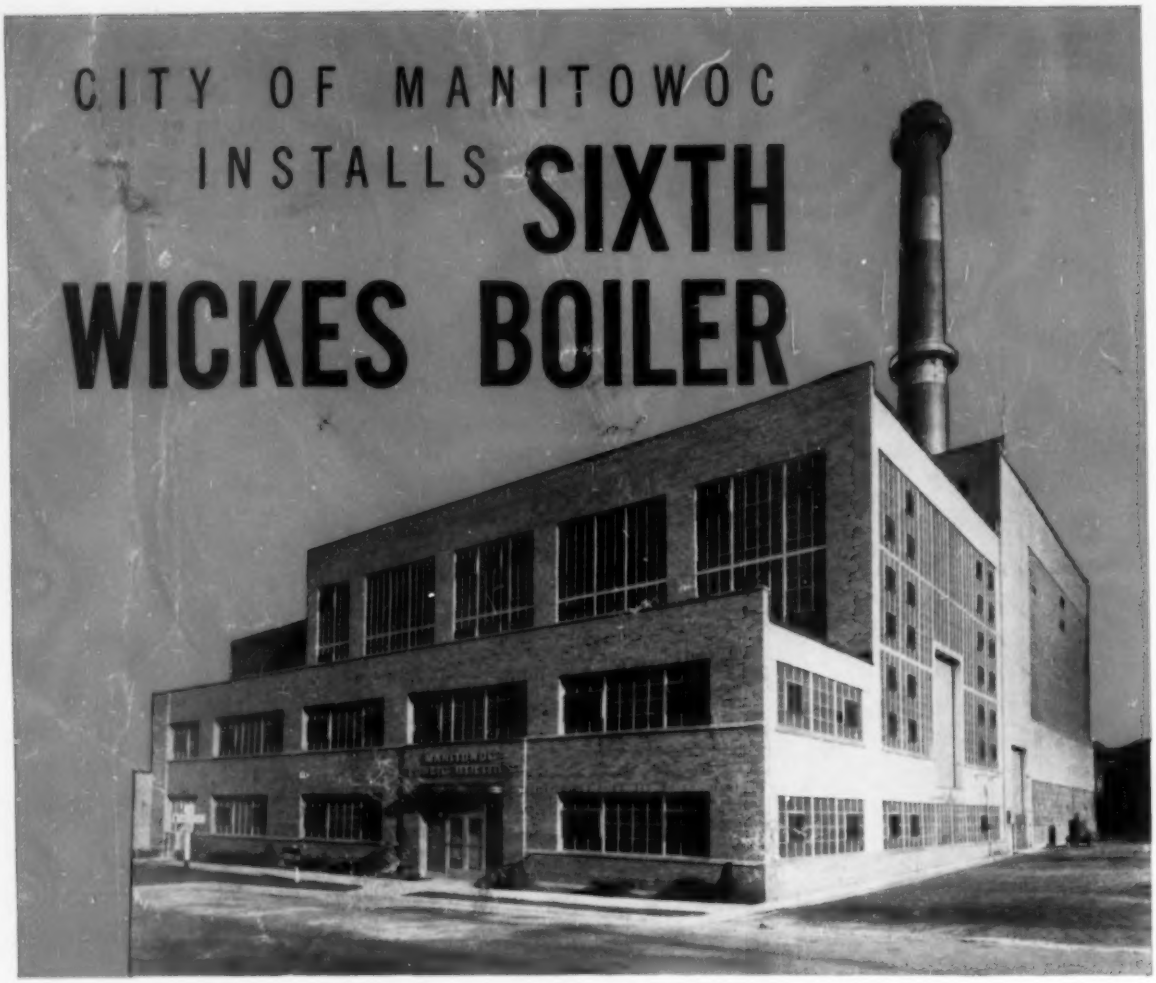
WE MUST FIND THE BALANCE OF POWER

Willard F. Rockwell, Jr., president of Rockwell Manufacturing Company, calls for solution to problem often ignored by industry—balance between horsepower and brain power

UNIVERSITY MICROFILMS
313 N First St
Ann Arbor Mich
Exchange List 1-50 I

$1.00 the copy
Over 60,000 copies of this issue

CITY OF MANITOWOC INSTALLS **SIXTH WICKES BOILER**



R. E. Connard—Chief Engineer and General Manager

Manitowoc Public Utilities Commission has just installed the sixth Wickes Steam Generator to help provide power for the City of Manitowoc, Wisconsin, and its surrounding area. The continued selection of Wickes equipment by this progressive municipality is a tribute to the dependability and quality of Wickes Steam Generators.

Wickes Boiler Co. builds steam generators for all branches of industry . . . for municipalities and for private and public buildings. Wickes units are available in sizes up to 500,000 lbs. of steam per hour and are designed for high or low steam pressures and temperatures, and for all types of fuels and firing methods. There is a Wickes design available for your needs.

Write for bulletin 55-1, showing the wide variety of designs and sizes available in both field-erected and shop-assembled* steam generators, or ask the nearest Wickes representative to call on you for full information.

*For the latest developments in shop-assembled boilers, investigate Wickes natural circulation A-type water tube units now built for capacities up to 75,000 lbs. per hour for oil and gas fuels. Request bulletins 56-1 and 57-1 for full information.

170

WICKES

WICKES BOILER CO., SAGINAW 15, MICHIGAN
DIVISION OF THE WICKES CORPORATION
RECOGNIZED QUALITY SINCE 1854 • SALES OFFICES: Boston • Chicago Cleveland • Dallas • Denver • Detroit • Houston • Indianapolis • Los Angeles Memphis • Milwaukee • New York City • New Orleans • Portland, Ore. Saginaw • San Francisco • Springfield, Ill. • Tulsa

Circle 9559 opposite covers.

CONVENTIONS and EXHIBITS

Mar. 1-4: Second National Lighting Exposition; New York Coliseum, New York.

Mar. 17-18: Air and Water Pollution Abatement Conference; Netherlands Hilton Hotel, Cincinnati, Ohio.

Mar. 18-20: 22nd Annual Short Course for Superintendents and Operators of Water Sewerage Systems; Louisiana State University, Baton Rouge 3, La.

Mar. 16-20: National Association of Corrosion Engineers; National Meeting; Sherman Hotel, Chicago, Ill.

Apr. 5-9: Edison Electric Institute Annual Convention; New Orleans, La.

Apr. 5-10: 1959 Nuclear Congress; Public Auditorium, Cleveland, Ohio.

Apr. 6-9: Rural Electric Generating Cooperatives 10th Annual Operating Conference; Hilton Hotel, Albuquerque, N. M.

Apr. 6-10: 1959 Welding Show; 40th Annual Convention; Hotel Sherman and International Amphitheatre, Chicago, Ill.

Apr. 16-30: Engineering, Marine Welding & Nuclear Energy Exhibition; Olympia, London, Eng.

Apr. 29-May 4: Oil-Heat Institute of America, Inc.; Seattle, Wash.

May 5-6: Interdisciplinary Conference on Self-Organizing Systems; Museum of Science and Industry, Chicago, Ill.

May 3-6: Air-Conditioning and Refrigeration Institute, Board and Annual Meeting; The Homestead, Hot Springs, Va.

May 11-13: Second Annual Power Conference of Instrument Society of America; President Hotel, Kansas City, Mo.

May 30-June 5: Fifth World Petroleum Congress; New York.

June 7-11: American Society of Heating and Air-Conditioning Engineers, Inc., Semi-Annual Meeting; Vancouver, B.C.

June 17-20: 1959 Engineering Progress Exposition; Hotel Commodore, New York, N. Y.

© 1959, Putman Publishing Co.

March 1959
VOL. 75 No. 3

POWER PLANT & POWER SERVICES INDUSTRY

PUTMAN PUBLISHING COMPANY • 111 EAST DELAWARE PLACE • CHICAGO 11, ILLINOIS

IN THIS ISSUE

13 Emergency generator saves the day

"A loss of power would mean economic disaster for us," states Dr. Mullen of Joliet Metallurgical Laboratories as he tells how an emergency generator eliminated possibility of disaster

14 Find the Balance of Power

To meet the problem of diminishing energy resources, W. F. Rockwell tells industry it must find the brainpower to manage the present and future sources of horsepower

16 Meeting a new technology

The production of effective rockets and missiles requires lots of testing beforehand. Rocketdyne uses many interesting services systems to supply the environments for these tests

18 Special troughs solve complex cable installation

SAGE — America's air defense system — uses a maze of cables, many of which are in some pretty tight places. Special trough and ladder designs handled the installation nicely

MONTHLY FEATURES

2 Conventions & Exhibits
4 Reports in Brief
10 Letters
20 New Developments
26 New Literature
29 Engineering Data
33 Photo News

Special Service for Readers

Want more information? Circle the key number of ad or editorial on the postpaid cards opposite back cover of this issue.

EDITORIAL STAFF

editorial director & publisher
Russell L. Putman

editor
H. A. Countryman

managing editor
George V. Michael

west coast editor
Karl Robe

advisory editor
John W. Bishop

advisory editor
Richard F. O'Mara

art director
Ralph C. Donges

editorial assistant
Erin Tomcheff

production assistant
Loretta Carlson

POWER INDUSTRY

. . . with which are combined INDUSTRIAL POWER and INDUSTRY POWER . . . serves the key men responsible for plant and power services throughout all industry, including utilities, and also in complexes of public institutions, schools, hospitals, etc.

The function of these plant and power services is to create and maintain the environment and provide the facilities necessary to effective operation of these industries and/or buildings, regardless of variety of products manufactured or uses of buildings.

The plant services include lighting, heating, ventilating, refrigeration, water supply and treatment and other conditions and material services needed for directed activity.

The power services include production, transmission and application of all forms of energy — steam, electric, mechanical, pneumatic, hydraulic, atomic — and the engineering and maintenance necessary for its continuance in:

- **MANUFACTURING AND INDUSTRY**
  - Chemical and process industries
  - Electrical and industrial machinery
  - Food and kindred products
  - Central utility stations and engineering headquarters
  - Textile manufacture
  - Gas companies and pipelines
  - Lumber and wood products
  - Waterworks
  - Metal industries
  - Stone, clay and glass products
  - Atomic energy
  - Transportation equipment
- **PUBLIC SERVICES AND INSTITUTIONS**
  - Hospitals
  - Office buildings
  - Hotels
  - Schools and colleges
  - Marine
- **CONSULTANTS**
  - Consulting engineers
  - Industrial architects
  - Contractors

Published monthly by

PUTMAN PUBLISHING COMPANY

PUTMAN PUBLISHING BUILDING
111 E. Delaware Place, Chicago 11, Illinois
WHitehall 4-6141

Also publishers of
CHEMICAL PROCESSING, FOOD PROCESSING, FOOD BUSINESS

ADMINISTRATION

Russell L. Putman	President & Publisher
Ewing W. Graham	Vice President & Treasurer
Richard H. Putman	Sales Manager
Roy G. Helsing	Production Manager
James C. Budd	Asst. Production Manager
George W. N. Riddle	Director of Research & Development
Thomas J. Scanlon	Director of Circulation
Robert C. McKay	Circulation Manager

Advertising Representation is listed on page 34

SUBSCRIPTIONS

QUALIFIED READER SUBSCRIPTIONS are accepted without charge from selected executives and engineers who manage plant and power services in plants and organizations. Subscriptions are accepted from "non-qualified" people—i.e., those whose job responsibilities are not within the orbit of management as described above—at $1.00 the copy; $10.00 the year in U.S.; $15.00 outside U.S. Note: Such subscriptions are available only as an accommodation and in response to specific request. They are not counted as "industry circulation" on BPA Audit Reports. Accepted as controlled circulation publication at Mendota, Ill., 1501 W. Washington Rd.

BUSINESS PUBLICATIONS AUDIT of Circulation, Inc.

NATIONAL BUSINESS PUBLICATIONS, INC.

BIRD-ARCHER'S 8 POINT WATER TREATMENT PROGRAM

Designed for Inplant Testing... Performed by Your Personnel... Backed by Experts

If you use water for power, process or cooling, it will pay you to look into Bird-Archer's 8 point Water Treatment Service. Every step in this Service is performed by qualified chemists and engineers whose main task is to design a system that can be implemented by *your own personnel* and at the same time place at your disposal *60 years' experience* in solving water treatment problems.

Bird-Archer's 8 Complete Engineering Services

- Complete studies of your use of water or steam.
- Exhaustive analysis of water supplies starting at source.
- Modern laboratory with seasoned chemists specializing in water analysis and research.
- Operational changes where necessary.
- Custom formulated chemical treatments for your specific needs.
- Complete analysis of savings and benefits where additional equipment may be helpful.
- Instruction of your personnel by experienced technicians in accurate control and test procedures.
- Periodic call-backs by your Bird-Archer Service Engineer to be sure you continue to get the best possible results.

A Bird-Archer 8 Point Service Engineer is only a "phone's throw" away. Call him for greater peace of mind.

BA-900

BIRD-ARCHER
WATER TREATING CONSULTANTS
The BIRD-ARCHER Company, 4337 N. American St., Phila. 40, Pa.
New York • Chicago
The BIRD-ARCHER CO. of California, 415 Brannan St., San Francisco • Offices in Canada and Mexico

Circle 9560 opposite covers.

American Power Conference

Nearly 90 papers will be presented at 27 technical sessions scheduled for the 21st annual American Power Conference to be held at the Hotel Sherman, Chicago, from March 31 through April 2.

There will be eight sessions devoted to the mechanical aspects of power generation and eight to electrical aspects, according to Conference Director, R. A. Budenholzer, professor of mechanical engineering at Illinois Institute of Technology, who sponsors the conference.

There will also be two sessions on nuclear power, two on hydroelectric power, five on water technology, one on space heating, and one general session.

The session topics include central station steam generators, operating experience with once-through boilers, large steam turbines, central station power plants, nuclear power plants, peaking service, industrial power plants, hydroelectric power and water technology.

Others are feedwater circuit, fuels, space heating, extra high voltage transmission, cables, circuit breakers, incremental loading, network analyzers, distributions systems and industrial power systems.

Radioactive waste — what to do?

Now that we are energetically involved in a true atomic age, what are we going to do with the residual materials that are being accumulated at an alarming speed?

Ocean trenches over four and a half miles deep and thousands of miles long have seemed the likely places as burial grounds for radioactive wastes.

It was assumed that these were troughs of stagnant water. There, the wastes could lie undisturbed for centuries in their concrete and metal coffins until their radioactivity was spent.

This glib assumption was questioned three years ago at the first UN International Conference on the Peaceful Uses of Atomic Energy. At the second meeting in Geneva, in September of 1958 the illusion was actually dispelled.

In the intervening years an expedition by the USSR ship, Vityaz, investigated 12 of these trenches. The findings of the expedition have shown that the trenches are unsuitable places for the disposal of radioactive waste.

At the conference Dr. E. M. Kreps (USSR) reported in detail on the Tonga Trench, which extends southward for nearly 700 miles from the Samoa Islands to the Kermadec Islands. The expedition found that, by comparison with the findings of the "Galatea" expedition in 1952, the deep water temperature had risen. This showed that even at the greatest depth a change of water takes place in as brief a space as five years.

The distribution of oxygen and phosphates and the presence of living organisms consuming oxygen at every depth showed that the water was actively mixing, horizontally and vertically.

Thus, the dangerous materials with long-lived radioactivity will be liable to break loose and escape upward into the upper layers of water. There, marine life would become radioactively infected and form a biological chain reaction which would end up in the food of human beings.

Both Britain and America have been dumping radioactive materials in the Atlantic trenches — but of a kind and on a scale which so far give no cause for concern. The

Americans have carried out regular surveys of their ocean graveyards and have found no evidence of any increase in the radioactivity of the water.

The safest place for storing atomic wastes are in tanks in which the radioactive substances are allowed to decay — and some of them will take centuries to do so. To the complications of storage is added the fact that in giving off their radiation the elements are producing heat which, in given circumstances, will cause the tanks to boil — and continue boiling for 100 years.

The US in 14 years has accumulated 60,000,000 gallons of radioactive elements stored in more than 100 indestructible steel tanks. The cost has been $65,000,000 so far. Some of the elements will remain dangerous for decades, others for centuries and, in the case of plutonium, for at least 4,000 years.

Forty-two years from now the amount of waste will require 100,000 acres a year as burial grounds by using the most compact methods. As one chairman commented, "The bombs of radioactive waste are becoming as elaborate and expensive as those for the mummies of the Pharaohs."

rings Swiss gears this country

An agreement which will make available in the US, Swiss-designed industrial gears providing precision tolerances not possible with American equipment has been signed by The Philadelphia Gear Corporation, and Maag Gear-Wheel Co., Ltd., Zurich, Switzerland.

Gearing manufactured by the Philadelphia Gear Corp., in the Maag machines will be fully in conformance with specifications and standards of the American Gear Manufacturers Association.

If steam costs give you

THAT FRUSTRATED FEELING . . .

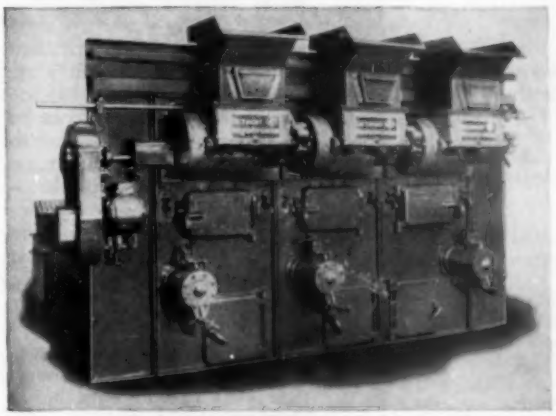
GET RID OF IT!

Modern DETROIT STOKERS under your present boilers will give you more steam at lower cost

If you can't get a new boiler plant you can still handle more load and reduce steam costs.

Many plants have done it by putting Detroit Stokers under existing boilers—to take advantage of improved combustion efficiency and higher burning rates. Savings and increased steaming capacities are substantial . . . are particularly worth while considering the moderate investment involved.

Let us show you the records of some of these plants. Investigation does not obligate you.



Detroit RotoStoker

One of the Detroit Stokers which will save you money. The line includes the LoStoker, UniStoker, Single Retort Stoker, Double Retort Stoker in the underfeed types . . . RotoStoker, RotoStoker Type CC (continuous cleaning) and RotoGrate Stoker (continuous ash discharge) in the spreader types.

There is a type and size of Detroit Stoker for any industrial or power need—3000 to 400,000 pounds steam per hour boiler capacity.

Detroit Stokers are available to burn all ranks of bituminous coals and lignites . . . and many waste and refuse fuels.

Our 60 years experience can be invaluable to you in selecting a type and size to meet your requirements.

Write for Bulletin.

Detroit Stokers cost less. Cost = initial investment + upkeep + production losses due to equipment outage. The total is less with Detroit.

COAL YOUR MOST ECONOMICAL FUEL

Most industrial plants are in areas where coal is the least expensive fuel. With Detroit Stokers it is by far the most economical.

DETROIT STOKER COMPANY

MAIN OFFICE AND WORKS • MONROE, MICHIGAN

District Offices or Representatives in Principal Cities

Circle 9561 opposite covers.

SCHAUB DEAERATION
doesn't cost...it pays!

Removes feed water oxygen to a guaranteed .03 cc/liter

Assures a simpler system that costs less to own and operate

The Schaub .03 is, in fact, one of the simplest deaerators ever built, designed around a unique and more efficient operating principle that removes oxygen to an actual and GUARANTEED .03 cc/liter.

Fully vented operation at atmospheric pressure — combined with pinpoint temperature control and Schaub "live action" heating of storage water — provides a forceful breakaway of air molecules that assures more effective oxygen removal under widely varying load conditions. At the same time the special Schaub spray contact vent condensing principle practically nullifies steam losses.

The Schaub .03 is completely safe! It needs no premium cost pressure shell construction—requires neither adjustment nor attention during operation—and takes practically no maintenance whatever! Even the exclusive Chromasoid lining is guaranteed against shell corrosion failure for 10 years.

Finally, no pressure-vessel insurance premiums to pay — ever!

Whether you reckon in original cost or the operating savings you'll achieve, no other deaerator in the 3000 - 45,000 lb. range offers you so much protection for so little. For fuller information on the remarkable "hows" and "whys" and savings advantages of the Schaub .03 Deaerator method, send for Bulletin 1300.

FRED H. **SCHAUB** ENGINEERING COMPANY
2115 S. Marshall Boulevard, Chicago 23, Illinois

Please send me, without cost or obligation, my personal copy of your Bulletin 1300 on Boiler Feedwater Deaeration.

FRED H. SCHAUB ENGINEERING COMPANY
2115 South Marshall Blvd., Chicago 23, Illinois

Name.....

Company.....

Address.....

City.....Zone....State.....

Circle 9562 opposite covers.

Water treatment in the USSR

A technical paper presented by two New York engineers, (Vincent J. Calise, General Sales Manager, and William A. Homer, Senior Process Engineer, of Graver Water Conditioning Co.) on a survey of water treatment practices in Russia and Eastern Europe, shows that the USSR lags behind the US in industrial water treatment technology.

Processes used by the Russians are hangovers from the 1930's and '40's and the adoption of newer techniques is hampered by expense.

The engineers presented their technical papers before a session of the 19th Annual Water Conference of the Engineers Society of Western Pennsylvania.

Water treatment is a significant indicator of industrial advancement since every type of manufacturing facility, as well as power utilities, requires the softening, clarification or other treatment of water before it can be used.

Poor quality water is a serious detriment to efficient plant operation. It is evident from the engineers' finding that the Soviet Union has had to make do, for the most part, with poor, old-fashioned equipment.

This has produced disadvantages which will not be overcome for many years and contributes to the higher cost per unit borne by many Soviet industries as compared to their opposite numbers in the US.

A comparison of water treatment costs for a utility shows that every item except labor is substantially higher in the Soviet Union. Even with this difference in labor costs, Russia still pays $2.56 for the treatment of every 1000 gallons of water while a comparable US facility pays 90 cents.

This is based on the official rate of exchange (25c to the ruble). The higher costs are still evident when a more realistic exchange of 10c to the ruble is used.

They found that such common US water treatment techniques as demineralization and lime-softening were rarely used in the USSR because of their expense. However, they cite a Soviet engineer who stated in 1957 that demineralization materials would be much more plentiful beginning with the following year. The authors also found that Russian equipment for reducing the oxygen content of water was crude in design and operation.

While following closely the development of water treatment technology in this country and Western Europe, the Russians, according to the paper, have in some cases gone off on their own to develop new methods.

One such method is a process known as desorptive deaeration whereby atmospheric nitrogen is used to remove oxygen from water. While this method has some advantages over conventional Russian practices, it produces approximately the same results, and these results are unacceptable in US industry.

The Russians are also experimenting with machines for the clarification of water as a supplement to gravity processes. Such equipment is well advanced in the US and is beginning to be used by towns and cities for the treatment of municipal water. The Russian machines have not been too successful and frequently become inoperable under severe conditions.

The yard and pound

The directors of the following standards laboratories: Applied Physics Division (Canada), Dominion Physical Laboratory (New Zealand), National Bureau of Standards (United States of America), National Physical Laboratory (United Kingdom), National Physical Research Laboratory (South Africa), and the National Standards Laboratory (Australia) have discussed the existing differences between the values assigned to the yard and to the pound in different countries.

To enable identical value

for each of these units in practice measurements for science and technology, it has been agreed to adopt an international yard and an international pound having the following definition:

the international yard equals 0.9144 meter

the international pound equals 0.45359237 kilogram

It has also been agreed that all non-metric calibrations carried out by the above laboratories for science and technology on and after July 1, 1959, will be made in terms of the international units as defined above or their multiples or submultiples.

The international inch, being derived from the international yard, is equal to 25.4 millimeters. This has also been adopted by Canada.

For the calibration of line standards and end gages having nominal lengths expressed in inches, the National Bureau of Standards is using the inch defined by the Mendenhall order published in 1893. The values corresponding to this are:

1 yard = 0.91440183 meter

1 inch = 25.4000508 millimeters

The inch used by the National Physical Laboratory of the United Kingdom is defined by the equation:

1 inch = 25. 399956 mm

The International inch is approximately 2 parts per million shorter than the inch presently used by the National Bureau of Standards, and somewhat less than 2 parts per million longer than the inch now used by the National Physical Laboratory.

During the transition period national Bureau of Standards calibrations of length or mass expressed in English units will embody a statement indicating clearly the unit which has been used if the choice introduces a significant difference in the calibration values.

Also, if the accuracy of the calibration is such that the certified values would be the same in either "International" units or the older units, the qualifying adjective "International" will not be used, i.e., the values will be expressed, for example, as so many inches or pounds.

How Commonwealth Edison Turned a Fly Ash Problem Into Profit

F-H AIRSLIDE FLUIDIZING CONVEYORS ANGLE DOWNWARD from precipitator hoppers, move air-activated ash to 20-ton central surge hoppers under floor. There are few moving parts.

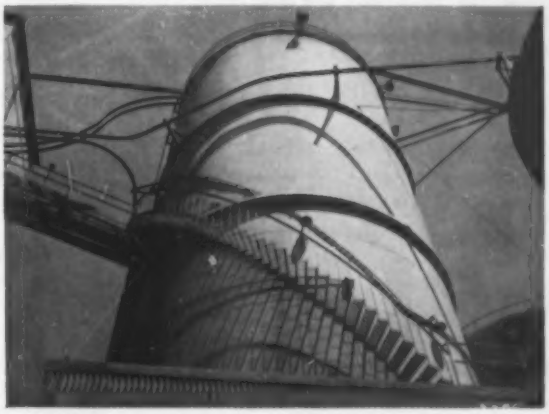
At Commonwealth Edison's State Line Station, about 350 tons of fly ash a day had to be wet down, loaded, and trucked to suitable dumping sites.

Waste becomes profit. Today, the plant burning a peak load of 5000 tons of coal daily collects dry fly ash automatically in a totally enclosed Fuller-Kinyon system. The ash is conveyed from precipitators to storage bins and silos, where it's sold as a by-product. Manpower: just three men, one at the main control panel and two bagging the ash for sales to local contractors.

Air and gravity do the work. F-H Airslide® conveyors fluidize dry fly ash by a column of low-pressure air for easy movement by gravity to central surge hoppers. Then, a Fuller-Kinyon pump under each hopper drives the ash by air through a five-inch line to storage. The system is practically maintenance-free. There are few moving parts to foul or wear out.

Large and small plants can get the benefits of Fuller-Kinyon fly ash handling. Capacities range from 100 to 8,000 cubic feet an hour. F-H Airslide and Fuller-Kinyon conveying lines can be curved to avoid beams and other obstacles. Low-pressure air provides power inexpensively and installation costs are significantly less than other types of conveying systems. Write for detailed information in Bulletin FF-49-1.

FULLER-KINYON PUMPS AND COMPRESSORS under surge hoppers propel ash to bins and silos at 20 tons an hour. Fluidized by air, the abrasive, 300°F. ash moves without injuring system.



BULK SILOS receive air-conveyed ash through Fuller-Kinyon pipe-lines. Farthest silo is 1,000 feet from pumps. Over 50% of fly ash is bagged and sold as a by-product.

1335
G-203

Fuller
...pioneers in harnessing AIR

FULLER COMPANY
186 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • New York • San Francisco • Seattle

FULLER COMPANY GENERAL

Circle 9563 opposite covers.

WHIRLEX
Shop Assembled
DUST COLLECTORS . . .

WHIRLEX FORCED DRAFT FANS are designed for heavy duty service in all types of boiler applications. Airfoil bladed impeller provides maximum static efficiency.

- - - Eliminate Costly Field Assembly

Whirlex dust collectors are designed to provide maximum collection efficiency for each specific type of application. The unit is then fabricated and completely shop assembled and need only be set in place and the hoppers bolted on at the installation site. Each Whirlex unit is rigidly inspected before it leaves the shop, assuring a completely "gas-tight" installation.

More specific information is available upon request.

Fly Ash Arrestor
CORPORATION
287 North First Street • Birmingham, Alabama

Dust Collectors • Induced Draft Fans
Forced Draft Fans • Exhaust Fans
Self Supporting Stacks • Duct Work

FLY ASH WHIRLEX ARRESTOR

Circle 9564 opposite covers.

REPORTS IN BRIEF

Sea water conversion

Southern California Edison Company announced award of a contract for pilot plant equipment which will convert sea water to fresh water at its Mandalay Steam Generation plant now under construction near Oxnard, California.

Costing more than $100,000, the saline water experimental equipment will be designed and furnished by Cleaver-Brooks Special Products, Inc. of Waukesha, Wisconsin. Cost of the over-all project, including installation and experimental operation, will exceed $250,000.

100,000 Gal Per Day

Test work with the new equipment, which will produce approximately 100,000 gallons per day, is expected to begin near the end of next summer. The Mandalay station is scheduled to begin operation this spring.

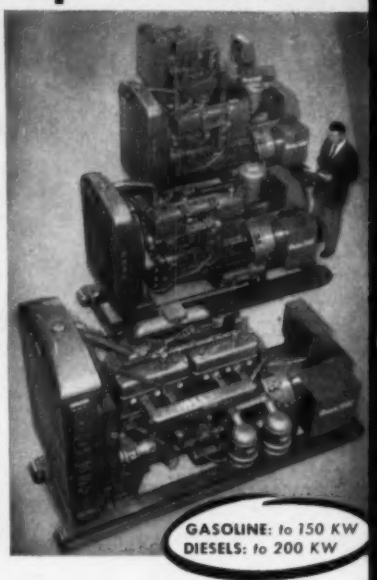
The purpose of this plant is to search out the methods of extracting potable water from sea water at as low a cost as possible. This pilot plant will be too small to freshen enough water for commercial use. Water from the plant will be used only to supply some of the fresh water needs of the Mandalay Steam Station.

Flexibility for Experiment

Cleaver-Brooks submitted a design which has a desired flexibility for the experimental operation. It can be used for both distillation using heat which is residual in cooling water, and for distillation using steam extracted from the turbine. This means it can be tested many different ways.

Although this pilot plant is a forward step toward the country's eventual goal of tapping the ocean's supply of water for use in home and industry, water produced by this plant is not expected to compete in cost with present Southern California sources such as the Colorado River or the proposed Feather River Aqueduct. However, such plants could be important to local areas of high water cost.

Now...Onan Electric Plants up to 200KW!



Equipped with new Magneciter Generator*

Now you can have Onan engineering and Onan dependability in high-capacity plants, too! In gasoline-powered models, 100, 125, and 150KW sizes have been added. New diesel models start with 10KW and include 15, 25, 35, 50, 60, 75, 100, 125, 150, 175 and 200KW capacities. All standard voltages are available.

All models are powered by heavy duty industrial engines matched to the power requirements of the generator. Custom modifications to meet particular needs add to the versatility of the new Onan line. Automatic controls for standby installations are available for each model. Magneciter generator is standard equipment on units of 100KW and larger.

Magneciter gives these advantages

- **Simplicity** — Eliminates hundreds of connections, the commutator and brush rig.
- **Constant voltage**—Voltage dip is less than 20% with motor starting load. Two-second recovery.
- **Lighter weight, more compact**—Plants are shorter by a foot or more, lighter in weight.
- **Less maintenance, easier servicing** — Static exciter and regulator are externally mounted, easily accessible.

**Onan alternator with static excitation and static voltage regulation.*

Write for specification kit!

Onan builds electric plants from 500 watts to 150KW, gasoline-powered; 3,000 watts to 200KW, diesel-powered.

Onan ELECTRIC PLANTS

D.W. ONAN & SONS, INC.
3325 University Ave. S.E., Minneapolis 14, Minn.

Circle 9565 opposite covers.

The need for better communications in jet age

"The jet age has increased the need for speedier and more efficient communications," it was reported at the Winter General Meeting of the American Institute of Electrical Engineers.

The report was made by C. H. Stewart, II, of Bell & Gossett Co., Morton Grove, Ill., in a paper describing a ground-to-air teletype system which is being used by the Air Defense Command in its Airborne Early Warning System.

The bulk of communications during World War II, plus difficult communications problems posed by mobile operations required more efficient and reliable communications than could be provided by conventional voice circuits.

Short Range Functions

"Voice communications are beset by the disadvantages of a relatively low transmission rate and an inherently high transcription error plus the requirement for a relatively good communications circuit.

"Consequently, the volume of traffic which is assigned to printed record communications is largely limited to short range command functions; it is conceivable that in the not too distant future, even this function will be supplanted by highly portable printing telegraph systems."

Commercial use of such systems also has increased, though not so spectacularly. Pointing out that while commercial air carriers are fulfilling their communication needs by voice circuits, "Recent aircraft developments, notably the advent of jet aircraft, have convinced operating personnel that a more efficient means of transferring data is an absolute requirement.

"This will apparently be handled as a two stage process; initially, by means of conventional printed record communications operation which can later be extended to high speed system for automatic processing."

HERE'S HOW YOU CAN SAVE MONEY ON PRESSURE SWITCHES FOR YOUR SPECIAL REQUIREMENTS...

For sensing pressure differences of .45 to 80 inches of water vacuum or pressure.
For extreme accuracy, single and dual setting switches in the working range of 30 inches of mercury vacuum to 100 P.S.I. pressure. Housed models.
For mounting in a common control cabinet, stripped models in the working range of 30 inches of mercury vacuum to 100 P.S.I. pressure.
For differential sensing of .05 to 100 P.S.I.
For dual setting high and low limit protection.
For widely adjustable differential and high proof pressure.
Explosion-proof models for low pressure and vacuum sensing, single and dual setting.
Models with variable actuation value.
Barksdale
For heavy duty, single and dual setting up to 7000 P.S.I. proof pressures.
Models with external calibration dial.
Explosion-proof models for high pressures.
For use with highly corrosive media.
For accurate sensing of high pressures, single and dual setting.
For extremely long service life, high proof at settings from 35 to 12,000 P.S.I.
For sensing high differential pressures.

If you feel that the pressure switch for your application has to be tailor-made to your requirements, we can offer you the know-how, the experience and probably considerable savings in the bargain.

The know-how is available to you in the form of an engineering and production facility entirely specialized on the design and manufacture of pressure switches. Ask to see the 20-minute sound movie, "The Meletron Story."

The experience we can offer you has been put to the test in every conceivable type of industrial pressure switch application. Ask our representative in your area to show you applications resembling your own.

The savings you can make will be apparent when you consider that there are over six hundred pressure switches listed in our catalog. Even if you should require a special pressure switch, the major components are already in production. Ask for the latest pressure switch handbook and catalog.

PRESSURE SWITCH DIVISION

Barksdale valves

5125 ALCOA AVENUE • LOS ANGELES 58 • CALIF

THERE IS A BARKSDALE REPRESENTATIVE IN YOUR AREA:

Alabama, Birmingham	Missouri, Kansas City
Arizona, Phoenix	St. Louis
California, Los Angeles	Nebraska, Omaha
San Diego	New Jersey, Neptune
San Francisco	New York, Buffalo
Colorado, Denver	New York
Connecticut, Wethersfield	Rochester
Dist. of Columbia, Washington	Syracuse
Florida, Miami	North Carolina, Charlotte
Georgia, Atlanta	Ohio, Cincinnati
Illinois, Chicago	Cleveland
Rockford	Dayton
Indiana, Indianapolis	Oklahoma, Tulsa
Kansas, Wichita	Oregon, Portland
Kentucky, Louisville	Pennsylvania, Abington
Louisiana, New Orleans	Pittsburgh
Maryland, Baltimore	Tennessee, Memphis
Massachusetts, Newton	Texas, Houston
Michigan, Detroit	Washington, Mercer Island
Minnesota, Minneapolis	Wisconsin, Milwaukee

Circle 9566 opposite covers.

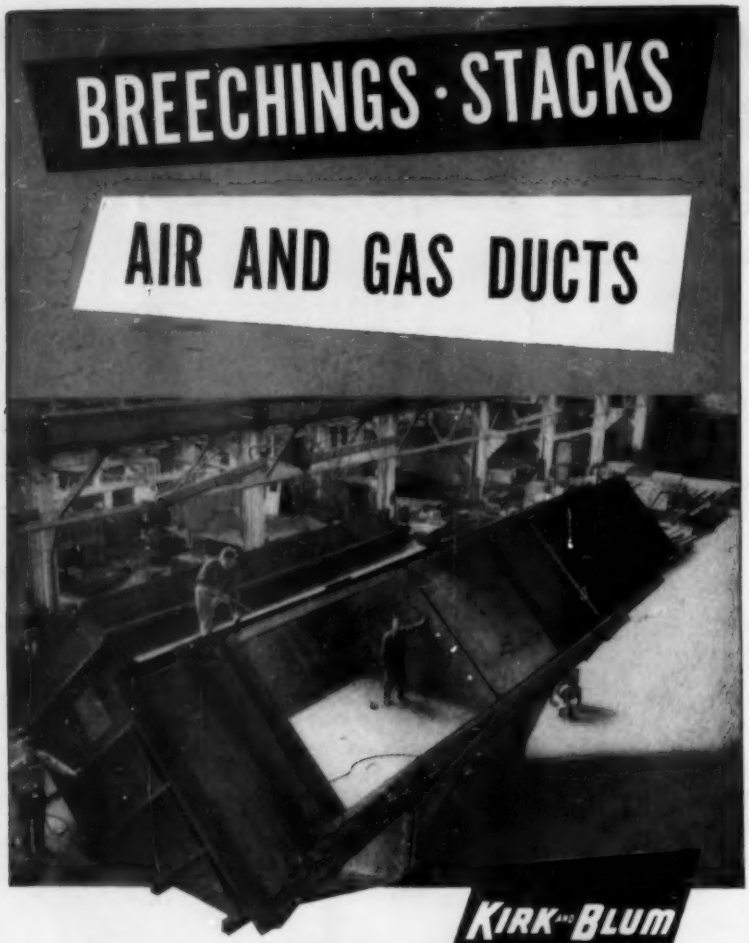


PLATE FABRICATION FOR POWER PLANTS

Whatever your requirements in fabricated plate, sheet or structurals for power plant use . . . call on experts!

Kirk & Blum has fabricated a variety of power plant needs as big as the mammoth breeching section shown here. In a 150,000 sq. ft. plant, with crane capacity to 25 tons, Kirk & Blum has complete facilities to produce, preassemble and load the largest fabrication. Kirk & Blum has the men, materials and experience to do the job quickly and economically.

For detailed literature, write: The Kirk & Blum Mfg. Co. 3174 Forrer St., Cincinnati 9, Ohio

KIRK & BLUM

FABRICATION

Circle 9567 opposite covers.

LETTERS

Your views are welcome in this column. Address "Letters, Power Industry, 111 East Delaware Place, Chicago 11, Ill." Letters should be brief and confined to the editorial of this magazine or other topics of interest to the plant and power services functions.

Offers nomograph

I note with pleasure that you printed my letter in the January 1959 issue (page 10) regarding the duct nomograph and a reproduction of the chart which I sent you.

Of course the reproduction is too small to use readily. I use one for each job and keep it with the other calculations for reference until the job is complete and has proven itself.

I had off-set prints made from my original and will gladly send one to anyone sending me a self-addressed, stamped 10 x 12 envelope. Then they can have as many off-set prints made as they may need.

H. A. DODGE
Consulting Engineer
250 East 43rd St.
New York 17, N.Y.

• *Our thanks to Mr. Dodge for his very kind offer to readers of* POWER INDUSTRY. *Readers desiring a larger copy of the nomograph may obtain one by following Mr. Dodge's request and writing him at the above address.*

—The Editors

Wow! Everybody wants clean motors

The January issue of POWER INDUSTRY refers to a "Freon" solvent used for motor cleaning. We would appreciate further information regarding this solvent, or an address where this information could be obtained.

E. L. SUTTON
Plant Electrical and Instrumentation Engineer
Rohm & Haas Company

Please advise where the Freon solvents referred to on page 6 of your January, 1959, issue of POWER INDUSTRY can be obtained for use as electric motor cleaner solvents.

EDGAR S. DIEHL
Purchasing Agent
Fuller Company

. . . Du Pont "Freon" solvent for cleaning motor windings, page 6, January 1959.

A. K. AMAZEEN
Hydro Superintendent
The Conn. Light and Power Co.

. . . Information on Du Pont Co. "Freon" motor cleaning solvent.

H. E. BEADLE
Group Leader Electrical
North American Aviation, Inc.

Reference is made to an article on page 6 of the January, 1959, issue of POWER INDUSTRY. This article states that considerable savings are being obtained by a Du Pont plant through the cleaning of motor windings with Freon.

We are interested in this matter and request additional detailed information including the Du Pont plant involved in performing this work.

R. D. EVANS
Assistant Project Engineer
E. I. du Pont de Nemours & Company
Louisville Works

. . . information on Freon solvents by Du Pont Co. How much per gallon and where to get it?

ROBERT LA GRANDER
Foreman
Parkin Ice Cream Co.

• *These are just some of the many requests we have received for more information on the use of Freon solvents for cleaning electric motor windings. All requests have been forwarded to the Du Pont Company.*

It is suggested that other readers who are interested in obtaining this information contact the Du Pont Company directly at the following address:

Public Relations Department
8531 Nemours Building
E. I. du Pont de Nemours & Co., Inc.,
Wilmington, Delaware
Attention: F. R. Zumbro

—The Editors

Write directly

Send copy of Condenser Handbook, C. H. Wheeler Mfg. Co., Dept. PI, 19th and Lehigh Ave., Philadelphia 32, Pa. Story is on page 26, January issue.

SIGURD R. JENSEN
Owner
Sigurd R. Jensen & Associates, Engineers

• *We are sorry, but we are unable to forward your request. The company, C. H. Wheeler Mfg. Co., has requested that all inquiries come to them direct from the reader on his company's letterhead stationery.*

If you should write them in this way and tell them that you would like to receive the handbook, we are quite sure the company will be happy to send one along.

—The Editors

Wants to move large boiler

Your January 1959 issue, page 33, shows a photograph of a 90,000 lb/hr boiler being moved intact over a highway a distance of 26 miles. I am interested in moving an 80,000 lb/hr field-erected boiler from North Philadelphia to Southwest Philadelphia at the lowest possible cost which may be by way of the Delaware and Schuylkill Rivers.

I would appreciate very much any information that could be made available to my company by the people who handled the Hanford Atomic Products Operation job.

Thank you for whatever assistance you may be able to render.

V. M. ZAFFARANO
Supervisor, Steam Power Engineering
Barrett Division
Allied Chemical & Dye Corp.

• *The General Electric Company planned and supervised transfer of the boiler, as GE operates the AEC's Hanford plant.*

The moving work was handled by Shaughnessy and Co., Auburn, Wash. GE engineer, T. W. Gore, directed the overall effort.

You may contact Mr. Gore for additional information. However, we believe that,

To next page

Trapping Standardization

. . . steam trap standardization plus standardized hook-ups spell lower maintenance costs

An important weapon in the fight against rising maintenance costs is standardization. It can reduce the variety of maintenance problems and simplify those which remain.

Since we specialize in steam traps we'd like to offer some suggestions for a trapping standardization program. Such a program involves standardization on one make of trap and standardization of hook-ups.

Trap Standardization

The advantages of standardizing on a single make of trap are important and can make a big difference in the cost and ease of repairs because—

1. You can carry a more complete stock of repair parts with a smaller inventory.

2. Maintenance personnel has the opportunity to become expert on one make rather than be "jacks of all traps."

3. As an exclusive user of one make of traps you become a preferred customer of your trap representative and can be sure of getting the best possible service.

4. You can enjoy the advantages of standardized hook-ups.

Standardized Hook-ups

Standardized hook-ups facilitate and reduce the cost of both original installation and maintenance. By adopting standards for the dimensions of all fittings, including nipples, each hook-up for a given size of trap is identical and can be fabricated in the pipe shop.

Unions should be used so that when a trap needs repair, the unions can be uncoupled, the trap lifted from the line and a spare carrying identical length nipples and half unions slipped into place. In as little as a minute or two a faulty trap can be replaced. The faulty trap can go back to the storeroom for repair when convenient and then be put into stock as a spare.

Figure 1 shows a typical standardized hook-up used by a major chemical manufacturer. Note how

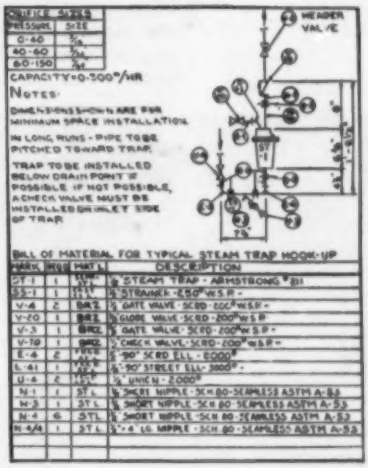

HEADER VALVE
CAPACITY=0-500#/HR
NOTES:
IN LONG RUNS - PIPE TO BE PITCHED TOWARD TRAP.
TRAP TO BE INSTALLED BELOW DRAIN POINT IF POSSIBLE. IF NOT POSSIBLE, A CHECK VALVE MUST BE INSTALLED ON INLET SIDE OF TRAP.
BILL OF MATERIAL FOR TYPICAL STEAM TRAP HOOK-UP
DESCRIPTION

Fig. 1—Typical standardized installation hook-up used by a leading chemical manufacturer.

the hook-up provides the following advantages:

1. Test valve in trap cap permits fast, easy checking of trap operation.

2. Strainer ahead of trap protects it against dirt and scale.

3. Blowdown valve in strainer provides easy cleaning.

4. Check valve in discharge line isolates trap when test valve is opened.

5. Shut-off valves and unions ahead of and following trap permit removal of entire trap from line.

Fig. 2—Armstrong traps have only two moving parts—the lever assembly and the bucket. Nothing much to go wrong here.

Another important consideration for getting the most from a standardization program is accessibility of the traps. Insofar as is possible, traps should be located so that they are convenient for inspection. The easier it is to locate and get at a trap, the less likelihood that it will be overlooked.

What Make of Trap? (This is the Commercial)

Obviously, a trap standardization program shows the best results when the make of trap selected is the one that gives the best service. Naturally, we think the make should be Armstrong and fortunately a lot of trap users agree. Here are some of the advantages of standardizing on Armstrong that have been pointed out by these users:

1. *Armstrong traps work.* They don't leak steam and they do discharge condensate and air as fast as they reach the trap. And they work with any return system.

2. *Armstrong traps aren't "prima donnas."* They need no special care or coddling. Valve and seat are hardened chrome steel. Lever assembly and bucket are stainless steel and these are the only moving parts.

3. *Armstrong traps aren't "orphans."* You can *always* get parts and service from nearby Factory Representatives and stocking distributors.

4. *Armstrong traps are guaranteed.* If you're not *completely* satisfied you can return the traps for refund of purchase price.

More Information

The 44-page Steam Trap Book (free on request) gives a lot more facts on trap selection and installation. Call your local Armstrong Representative or write **Armstrong Machine Works, 8202 Maple St., Three Rivers, Michigan.**

ARMSTRONG STEAM TRAPS

Circle 9568 opposite covers.

NON-FLUID OIL

TRADE MARK REGISTERED

MOST EFFECTIVE FOR PRESSURE LUBRICATION

NON-FLUID OIL meets every requirement of a lubricant for centralized pressure lubrication no matter what types of bearings are to be served by the system. Because it is neutral, NON-FLUID OIL is particularly desirable for ball and roller bearing applications, as it protects these bearings from pitting and corrosion.

NON-FLUID OIL is the most effective lubricant for modern centralized pressure lubrication systems. It does not disintegrate, thin out under heat, harden at low temperatures or under highest pressures causing valves in systems to stick and function improperly.

Try it yourself. Write now for useful Bulletin No. 522 and a free sample for on-the-job testing.

NEW YORK & NEW JERSEY LUBRICANT COMPANY

292 Madison Ave., New York 17, N. Y.
Works: Newark, N. J.
Warehouses

Birmingham, Ala.		Greensboro, N.C.
Atlanta, Ga.	Greenville, S.C.	Detroit, Mich.
Columbus, Ga.	Chicago, Ill.	Providence, R.I.
Charlotte, N.C.	Springfield, Mass.	St. Louis, Mo.

NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture.

Also represented in principal industrial centers, including Pittsburgh, Pa., Cleveland and Cincinnati, Ohio.

Circle 9569 opposite covers.

LETTERS

From preceding page

through talks with local movers and contractors, you may arrive at a low-cost method for moving your boiler.

We are sending Mr. Zaffarano another photograph of the moving operation. It gives a good idea on how the operation was handled.

—The Editors

Wants address

We noted with interest in the January, 1959, issue of POWER INDUSTRY an article concerning development of a lamp whose light approaches sunlight (page 4) by the Duro-Test Corporation. Could you kindly let us know the address of this organization so that we can inquire further.

GEORGE O. MYERS
Vice President
Comstock Foods, Inc.

In your last issue we saw an article that mentioned a Fluomeric Lamp made by Duro-Test Corp. We would like more information regarding this lamp and also the address of the corporation. Thanks.

F. F. WHITE
Purchasing Agent
The Goodyear Tire & Rubber Company

• *Address of the Duro-Test Corporation is:*
Duro-Test Corporation
2300 Hudson Blvd.
North Bergen, N. J.

—The Editors

Can't find company

On page 33 of the January 1959 issue of POWER INDUSTRY, there is a picture of an aluminum enclosure for substations. The supplier is identified as Joslyn Mfg. & Supply Co., Cleveland.

Thank you for supplying me with the company's full address.

E. P. STREET, JR.
Staff assistant to
Chief Plant Engineer
Merck Sharp & Dohme

• *Reader Street's request has been passed on to Joslyn Mfg. & Supply Co. whose address is 155 N. Wacker Drive, Chicago, Ill.*

—The Editors

HERE is your HORN

You designed it!

FEDERAL, custom tailored the Vibratone to your expressed wish and suggestions.

Now, you can have it!

Here is your horn that --

- fits any 4" sq. outlet box
- is self tuning
- has full-range volume control
- installs almost instantly
- is extremely compact
- has attractive appearance
- is durable, trouble-free

It's a new, modular design. Add simple accessories for flush mounting, or a projector type. Various wiring devices permit semi-flush, surface, concealed conduit, or weatherproof installations.

SPECIFY the new #350 *Vibratone* horn to your electrician, contractor or architect. It simplifies their problems, too.

Priced competitively! Write today

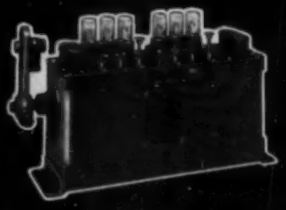
FEDERAL SIGN and SIGNAL Corporation 8709 S. State St., Chicago 19, Ill.

Circle 9570 opposite covers.

accurate...
controlled...
timed lubrication...by

MANZEL

• Wide range of lubricators and controls, in single and multi-feed units. Experienced field engineers at your service to solve any problem.



HOUDAILLE Manzel

320 Babcock Street
Buffalo 10, N. Y.

Specialists in metering pumps and lubricators since 1898

Circle 9571 opposite covers.

"Emergency generator saved our testing lab from big losses"

DR. WYLIE H. MULLEN, JR.
Vice President
Joliet Metallurgical Laboratories, Inc.

"Do not turn power off for y reason", reads the sign on e control panel door in our tallurgical laboratory.

And we mean just that.

For an interruption of pow- for a matter of seconds can an the loss of days, weeks, n months of work on our ucial high temperature ts.

We operate a metallurgical oratory using 50 test stands conduct creep and stress- pture evaluations of the perties of materials used by Department of Defense.

Tests involve heating mate- ls to temperatures as high 2200°F in resistance- und furnaces. Loads are n applied to the metallic terials and tests carried on as long as 5000 to 10,000 urs.

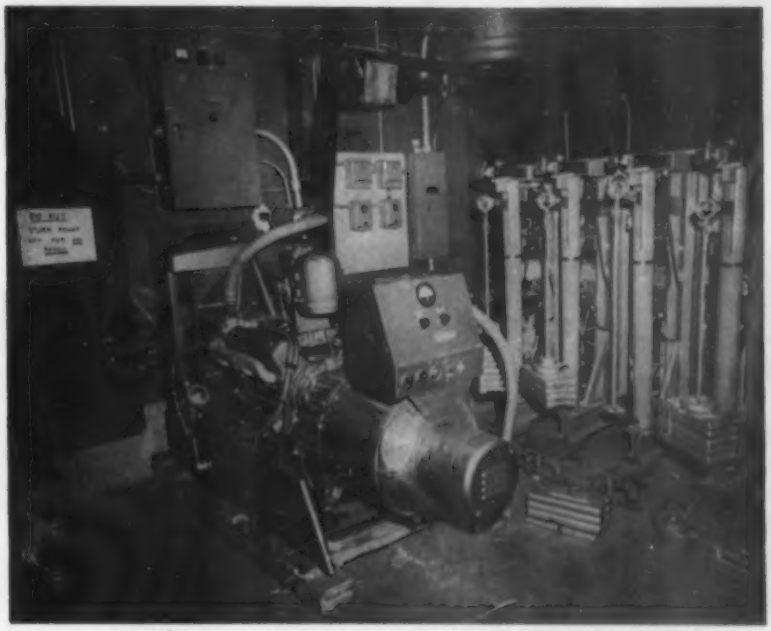
Should a test be interrupted e to a power failure, we uld have to initiate a new t. Such an interruption en a number of long term ts were in progress would an economic disaster for us. Because uninterrupted power is basic to our operation, one of the first pieces of equipment we installed was a 35,000-watt emergency electric generating plant. This gasoline-engine-driven plant is equipped with an automatic line transfer control to insure power around the clock.

In seconds last summer this stand-by plant paid for itself. During a severe electrical storm our regular source of power was lost. The emergency generator cut in instantly.

No variation occurred in the temperature of any of our test furnaces, where a degree change would have been detectable on the multipoint recorders used for surveillance. For more than an hour the plant produced the constant and vital power so necessary for our operation. Much time and money were saved, as well as the reputation of our newly formed testing lab.

(Emergency electric generating plants are produced by D. W. Onan & Sons, Inc., Dept. PI, Minneapolis, Minn.)

Circle 9572 opposite covers.



On right are some of 50 high temperature test stands having insured power source from this 35-kw generator

In the electric furnace test stands, metallic specimens must be heated to a temperature of 1800°F. A loss of power would mean a disaster

As energy resources continue to diminish, the reserve of brainpower needed to come up with alternatives and solutions to this problem must continue to increase. However, this has not been the case in the past few years. All industry must realize this problem and try to find the balance between past, present and future sources of horsepower and the brainpower to manage it . . .

INDUSTRY'S PROBLEM: find the balanc

WILLARD F. ROCKWELL, JR.
President
Rockwell Manufacturing Co.

Willard F. Rockwell, Jr. will be the keynote speaker at the opening session of the 21st annual meeting of the American Power Conference to be held March 31, April 1 and 2 at the Sherman Hotel in Chicago.

The American Power Conference is sponsored by the Illinois Institute of Technology with the cooperation of various universities and technical societies.

The Conference's purpose is to provide a national forum for discussion of problems and for the exchange of information concerning matters of interest to the power and associated functions.

As keynote speaker of that opening session, Mr. Rockwell talks with authority on technical manpower problems facing all industry. He speaks with authority as president of Rockwell Manufacturing Company, whose family of products (Edward Valves, Nordstrom Valves, Republic Flow Meters) is familiar to everyone.

Speaking with the authority of a technical man, he is — besides being a registered professional engineer in Pennsylvania — a director of the American Gas Association and a member of the American Petroleum Institute, American Water Works Association, and American Society of Mechanical Engineers.

WITH the American Power Conference just around the corner, we are reminded of a problem too often ignored by industry and the general public . . . our "Balance of Power." By Balance of Power, I mean the balance between past, present and future sources of horsepower and the brainpower to manage it.

Looking back on our modern industrial revolution, we see that the amount of power backing up each industrial worker has quadrupled in the 60 years since 1900. In the next 15 years, the power behind each industrial worker will almost triple. Add to this the effect of a relentlessly growing working population, and we clearly see the problem before us.

No longer can we withdraw with comparative carelessness the energy resources buried with the fossils of ages past. Known economic fossil fuel reserves will carry us only about 75 more years. The simple economics and technology that has shifted our energy sources from the backs of animals and felled timber to water to coal to oil and then to gas will be complicated by the more intricate economics and technology of nuclear energy, solar radiation, and direct energy conversion.

The Balance of Power in industry must take into account not only these basic sources of energy, but must evaluate ultimate energy delivery through compressed air, electricity, steam, hydraulics, turbine drives, gears, belts, ad infinitum.

I would not presume to chart a course through these alternatives for the future. Difficult as such technical problems may be, experience tells us that the answers are forthcoming. I raise this technical phase of the Balance of Power problem as the backdrop for a more serious problem, far more difficult to solve. That is the brainpower problem.

Progress

I would reiterate, here, something I have had occasion to say before: We who are concerned with water, gas, steam, and electric utility services are in a peculiarly paradoxical position. On the efficiency with which we do our job depends the economic well-being of industry and the general public. Yet the better we do our job, the less notic is taken of that job. Today' progress becomes tomorrow' habit.

Only when a steam lin bursts, or when an electric outage occurs, or when wate supply stops, or when heatin ceases, do the people we serv take notice of our existenc While time has increased th dependence of our economy o power, it demands of us mo technical training, greater ex perience and more matu judgment.

Yet in the face of our gre technical challenges in th power business, we find t few men staying in the pow er business. We find enginee ing colleges curtailing a halting power curricula. W have a Balance of Pow problem not only in selecti the sources from which futu energy will come, but fro which the brains will come tame and apply that energy.

This phase of the proble interests me now. For whi rockets and exotic fuels m solve some problems, we sh long live with the everyd demands of industry, co merce, agriculture, and t home for water, steam, ele tricity, and air.

Lack of Brainpower

Where do we go from he for the brainpower we seem lack? We who are concern with power must begin to fig the complacency that our i creasingly better service co tinuity breeds.

How? Within our indust

f power

irst, we must back up the nstitutions that already exist. hese institutions include the merican Power Conference, oon to convene in Chicago for ts 21st meeting. They include he Founder Societies, now ngaged in building a new eadquarters in New York. hey include the local sections f all the professional societies. hey include the colleges that rain the men that must re-lace us as time goes by.

Within our individual com-anies, second, we must re-nove the insulation around ur operations. (How many eople in your top manage-ent know the amount of nergy you supply per man-our of labor and per unit of roduct?) We must stop using ngineers for technicians and raftsmen. We must put more reativity into their thinking.

Third, we must let the pub-ic at large know how much ower they get from their wall ockets, water taps, gas lines, nd fuel tanks. Power is no onger kept in the wood shed, r down the well, or in the eed bag.

The story we have to tell is stounding. Because power is ost always there, we and hose we serve take it for ranted. Because our future ower needs are so great, ower will become a matter f greater public interest. We ust recognize this now.

And if there is to be bal-nce in the production and anagement of power in the uture, we must get out of our ocoons now and tell our story. o one else will. ■

NORTHERN STATES POWER COMPANY • BLACK DOG STEAM PLANT NEAR MINNEAPOLIS AND ST. PAUL, MINNESOTA

PUBLIC UTILITIES

served by UNITED ELECTRIC COALS

Electric public utilities and basic industries in the middle west know from long experience that it is good to depend on United Electric. For uniformly prepared coals. For large tonnages. For flexibility of distribution by rail or low-cost, all-water transportation on the inland waterways. For helpful service and prompt shipments to meet all your normal and emergency requirements for coal.

BUFFALO CREEK	FIDELITY	CUBA-BUCKHEART	MARY MOORE	RUBY
washed West Kentucky No. 6 industrial and domestic stoker coal	*domestic and industrial stoker coal*	*precision prepared coals*	*No. 7 Illinois for industrial and utility use*	*washed West Kentucky No. 11 for industrial and domestic use*

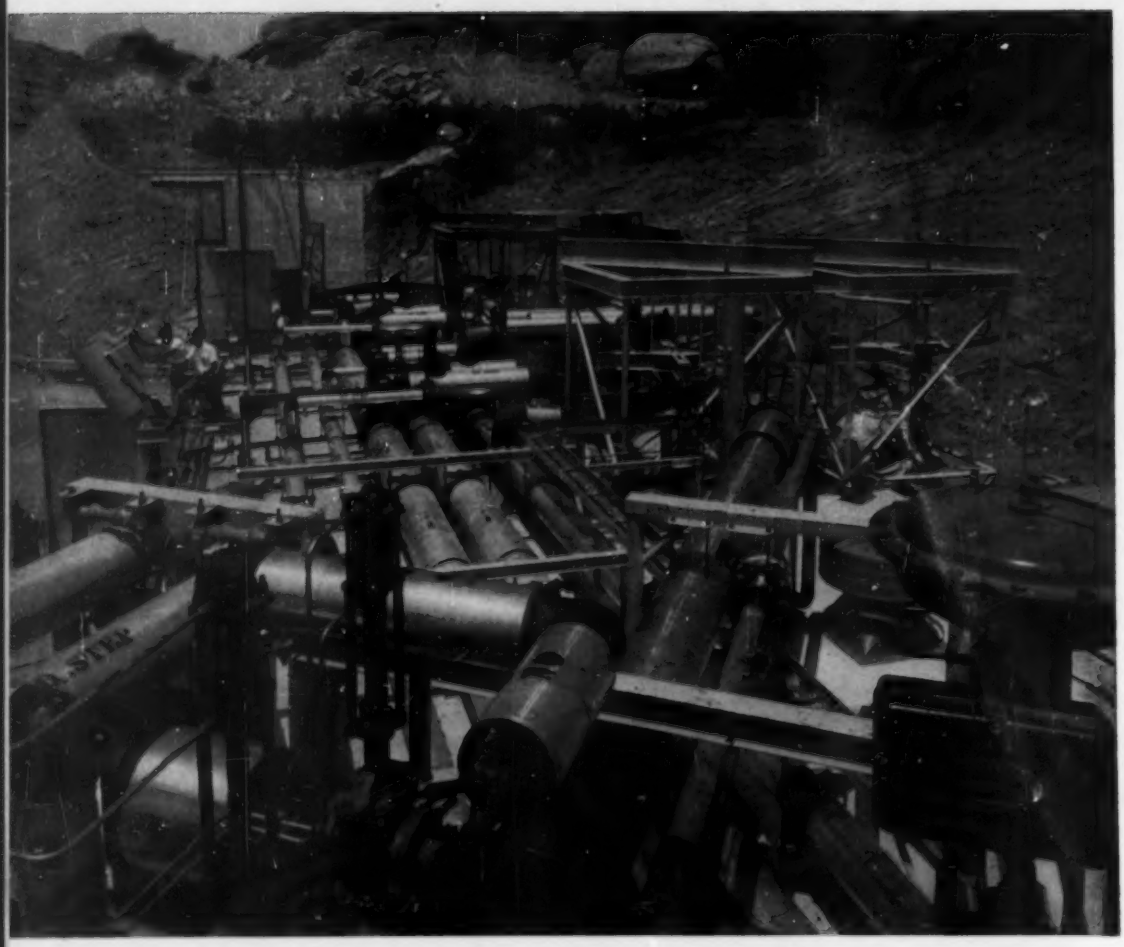
THE UNITED ELECTRIC COAL COMPANIES

CHICAGO, 307 N. Michigan Ave., Phone CEntral 6-6580 • PEORIA, Commercial National Bank Building, Phone 3-3711 • ST. LOUIS, Ambassador Building, Phone GArfield 1-3732

Circle 9573 opposite covers.

Rocketdyne's test labs can produce any type of weather condition that rocket engines may encounter. In order to supply these unusual environmental conditions new technological twists are incorporated in the services systems . . .

Creating Environments fo

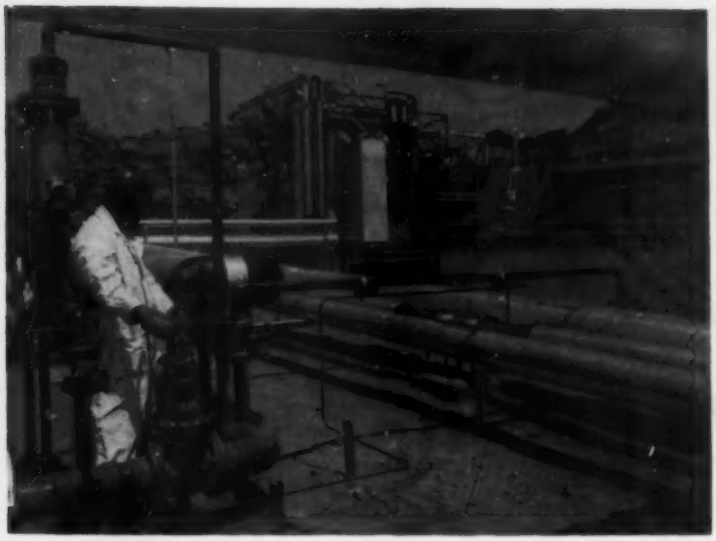


J. T. BANZON
Senior Test Engineer
Rocketdyne,
A Division of North American Aviation, Inc.

IN the Santa Susana moun tains of Southern Californi Rocketdyne, a division North American Aviatio Inc., operates an intricat complex of test stands an laboratories in support of i development of high-thrus liquid-propellant rocket en gines which propel the Atla Thor, Jupiter and Redston ballistic missiles.

Among the installations the Propulsion Field Labora tory is a five-building com plex of Components Test Lab oratory III, a new facility de signed to advance the state of-the-art in rocket engin technology to a new high lev el. As rocket engines an component parts must be sub jected to and tested at ex treme temperatures of —40°

Maze of pipes making up "brin system for extreme hot or cold te perature conditioning of rocket e gines at Rocketdyne. Pipes are e closed in 12 inches of foam glass i sulating, jacketed with aluminum



Refrigeration system cools brine for cold temperatures; hot water from boiler heats it up. Interlocked control valves introduce heating or cooling media into common heat exchanger to produce desired temperatures

To give accurate temperature and humidity in test cells, complex instrumentation is needed. Two-hundred-foot tunnel connects each of three cells with recording center — open trays carry instrumentation cables

Space-age Testing

to +165°F; humidities ranging from 0 to 98 percent; and rainfalls up to 5 inches per hour, the service systems are called upon to supply a multitude of environmental conditions.

Design and Operation

These extreme conditions are accomplished by both the introduction and extraction of heat by the same medium — trichlorethylene (used as the "brine"). Under cold conditions, trichlorethylene is chilled by a refrigeration system; under hot conditions, it is heated by a water boiler. The humidity is controlled by introduction of water as a fine mist, almost as a fog. All these are controlled automatically.

The environmental laboratory is composed of four well-insulated boxes of approximately 2150 cubic feet capacity each, in which the rocket engines are tested. These boxes are separated from each other with concrete walls and have doors opening on one side, all facing a control center some distance away.

The boxes are provided with an enclosed air duct through which air is circulated by a blower through a radiator type heat exchanger where the air is chilled or heated. In back of these boxes are two fuel tanks, each provided with its own heat exchanger and fuel circulating pump. The environmental equipment is located on a "farm" about 100 feet on the side and back of the boxes or cells.

The cold "brine" system is made up of 6-inch copper tubings running from the farm, where brine is circulated by a pump to a chiller where it is cooled by refrigeration equipment. Cold brine from the chiller flows from the farm through the 6-inch copper tubing to all the cells at the end of which is a back-pressure regulator. The brine returns to the farm and into the brine circulating pump. On the suction side of the pump an expansion tank is "teed-off" to provide for expansion and contraction of the brine.

The back-pressure regulator maintains a pressure difference between the brine supply and return line by throttling the flow to this valve automatically depending upon the brine demand of the cells being chilled.

Each cell and fuel heat exchanger tees off from the 6-inch tubing brine supply and return line. The heat exchangers are in turn isolated by GN_2 pressure-operated gate valves. Just before the inlet side of the heat exchangers is a flow-regulating valve. In this way, cold brine is circulated through any of the heat exchangers by opening the gate valves, with the cell temperature being regulated by the flow-regulating valve.

The hot brine system is similar to the cold brine system with the exception that, instead of being chilled by a refrigeration equipment, the brine is heated by a water boiler. The cold and hot systems are independent of each other, permitting one cell to be chilled while another is being heated. Both hot and cold systems use the same heat exchanger for heating or chilling the fuel and air. The GN_2 operated valves are interlocked so that the cold-side valves and hot-side valves cannot be opened simultaneously.

Refrigeration System

The refrigeration equipment used for chilling the brine is a two-stage compound type. Freon 22 gas at low pressure is compressed by a rotary compressor to an intermediate pressure where the superheat is removed by mixing with freon from the intercooler. Freon gas at the intermediate pressure is compressed by a reciprocating compressor and then flows to the evaporative condenser where the gas is condensed to liquid freon.

Liquid freon, under high pressure, goes to an intercooler where it is cooled by part of the liquid freon that has been expanded. The liquid freon is further cooled in the heat exchanger by freon that has been expanded in the chiller. Cold liquid freon is expanded to the chiller where it is converted into gas and picks up the heat of the brine.

After it leaves the chiller, the cold freon gas picks up additional heat in the heat exchanger before it is compressed again by the rotary compressor. This completes the cycle.

The refrigeration equipment cools the brine at a constant −65°F. There is also a flow switch on the cold brine system which actuates the rotary compressor. In this way the equipment goes on an automatic pump-down cycle when brine is not flowing, maintaining the system on

To page 32

SPECIAL TROUGH AND LADDER DESIGNS SIMPLIFY SAGE'S COMPLEX CABLE INSTALLATION

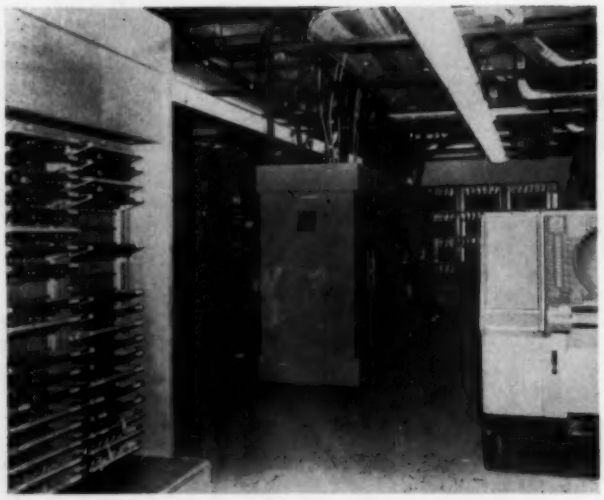
SAGE — a revolutionary concept in air defense — has become a reality with the start-up of the first system Direction Center at McGuire Air Force Base, N. J. As designed, SAGE (Semi-Automatic Ground Environment) is a complex of interconnected computers, radars and other electronic mechanisms designed not only for round-the-clock air surveillance of the continental United States, but for directing air defense installations semi-automatically in event of enemy attack.

The power and control circuits feeding this maze of equipment consists of over 1000 miles of cable. A major problem arose when it came time to develop a method of supporting all this cable in a standardized structure.

Western Electric Company, the prime contractor, chose cable trough and ladder to keep the miles of cable from becoming a complex headache.

Of all cable supporting systems, these are least costly to install, require less material, reduce confusion during installation, simplify design and layout time, and — very important in the SAGE installations — require minimum space. Moreover, cable trough would simplify re-routing of cables when demanded by new designs or expansion.

Prime power is carried direct to prime power DC-frames. From these it is distributed through interlocked armored- and neoprene-jacketed cables on trough or ladder to handle the multitude of cables. Circuits are distributed through vertical cable-trough runs to a horizontal run near the ceiling of a floor. From here they come up through the floor to enter the bottom of the consoles on the next level.



◀ Single unit of huge SAGE computer installation stands at center. Note the way cables are cascaded over side of trough into unit

Cable trough is expanded steel in lengths of 8-12 feet and widths of 6-24 inches. Sides are three inches high and protected by a binder strip.

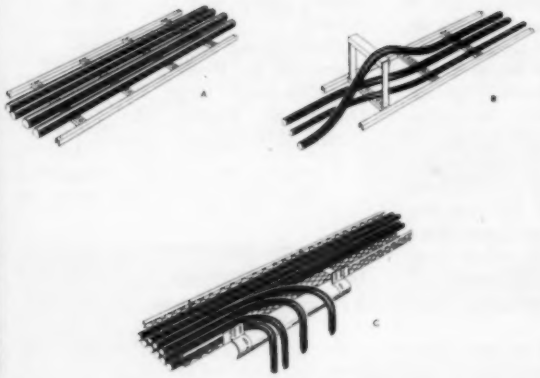
Ladder is made of lengths of steel connected by rungs. Both trough and ladder systems include various tees, crosses, branches, and risers in various angles and widths for flexibility during installations. This accounts for a minimum of field fabrication with the consequent reduction in the installed cost of entire system.

The complex SAGE installation called for some adaptations of standard trough and ladder design. Frequently, for example, dropouts through the bottom of cable trough occurred at connections between runs. Many of the cables were supplied either with a Nike nipple or harness, neither of which could be accommodated in the standard frame dropout.

Moreover, it was desirable to keep the holes in the bottom of the trough even smaller than usual. In other instances, the solution was to cut the edge of the trough at every dropout. The dropout was placed at that point and cables could be lifted in over the side. A special gate was supplied to swing out on a hinge and lock back into place with a pin when the cables were installed.

Another technique used extensively was a one-sided trough that allowed cables to be "cascaded" over side of the trough. When many cables drop out of trough at close to same place, it is costly to install dropouts. A simple way is

ROBERT M. WADE
T. J. Cope Division
Rome Cable Corp.



ecause of special fitting, large arness of Nike nipple cannot be assed through bottom of cable rough. Pin coupler used to con- ect separate sections of cable rough makes it possible to cut dge of trough and swing it out like a gate

Special cable trough designs developed for the SAGE installation include: A) ladder only 1¼" thick to fit in special small area of only 15" B) bridge to cross-over segregated cables without confusion C) cascade fitting to permit cables to be dropped out over side and eliminate cost of cutting through base of trough

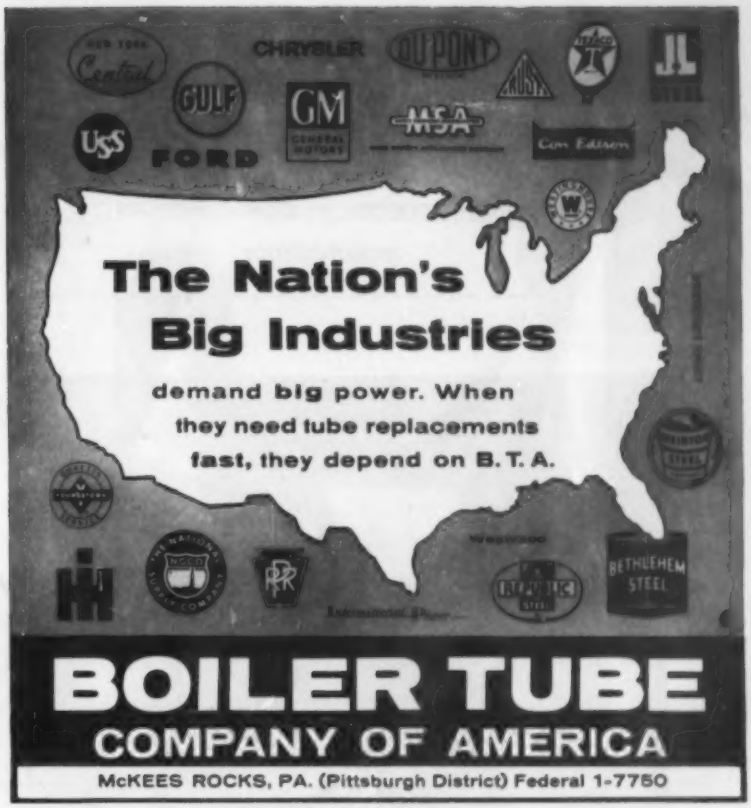
o drop them over the side. A pecial fitting was supplied to ecure the first fitting to the ide of the trough and so pro- ide a continuous "side."

The problem of crossing ables is awkward whenever hey must be segregated. A bridge" solved that problem. These bridges — something ike inverted croquet wickets, inches high — were used to arry one set of cables over nother. Cables were secured o bridge by lacings.

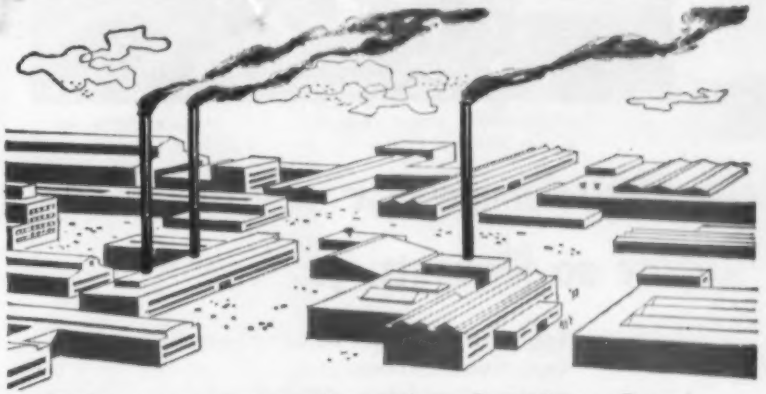
Finally a type of ladder was eeded to fit in narrow spaces. n an area only four feet deep great deal of air conditioning lucts and many signal junctions had to be jammed.

Cables for the 128 consoles also had to fit in and only 15 inches was allowed. As this didn't leave much pulling room, a special support 1¼ inches thick was worked out to use standard materials. Three special hooks were supplied to secure trough, ladder, and Western Electric Special to the supporting racks.

(Cable trough and ladder were supplied by T. J. Cope Division, Rome Cable Corporation, Dept. PI, Third and Walnut Streets, Collegeville, Pennsylvania.)
Circle 9574 opposite covers.



Circle 9575 opposite covers.



Glass-protected stacks...

Permaglas® smokestacks are glass-protected(inside and out)... are virtually impervious to condensate corrosion

✱ Accelerated life tests prove that *Permaglas* stacks last 3 to 5 times longer than plain steel stacks

✱ *Permaglas* stacks are easy to install—no special equipment needed

Write for the money-saving facts . . . get Bulletin SS-202

Through research . . . a better way
A.O.Smith
PERMAGLAS SMOKESTACK SALES
PROCESS EQUIPMENT DIVISION
MILWAUKEE 1, WISCONSIN

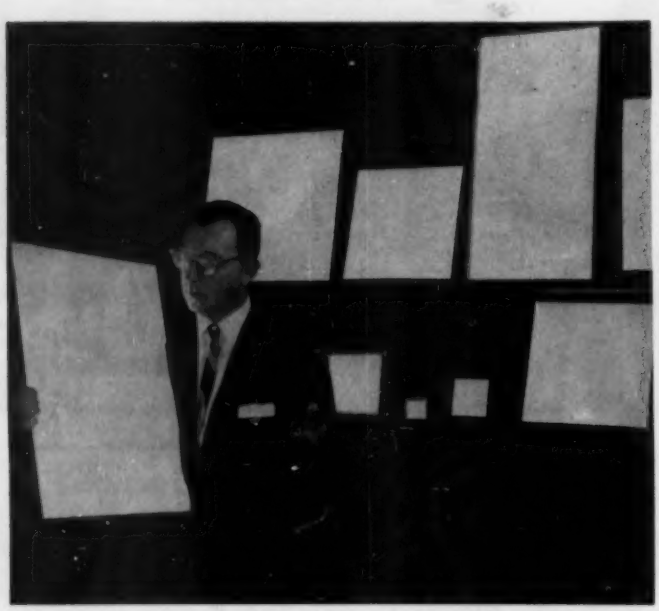
A. O. Smith Corporation, Dept. PI-39, Milwaukee 1, Wis.
Gentlemen: Please send me a copy of the Permaglas Smokestack Bulletin No. SS-202.
Name_____ Title_____
Firm_____
Address_____
City_____ Zone____ State_____

Circle 9576 opposite covers.

NEW DEVELOPMENTS

plant services — power services

maintenance



Electroluminescent lamps consist of sheet of glass with an electrical conductive coating and phosphor layer which produces light

Electroluminescent "light bulbs" use no filaments, gas, vapor

Series of flat "light bulbs" produce no heat, consume negligible current, and produce completely diffused light

Man's newest light source — electroluminescent "light bulbs" — is now available for commercial applications. The bulbs in the form of flat panels use no filaments, gas or metallic vapors. They produce no heat, consume a negligible amount of electric current and produce a completely diffused light with no special fixtures or baffles required.

Basically, the lamp consists of a sheet of glass with an electrical conductive coating and a phosphor layer. When voltage is applied, light is produced by the phosphor.

Coming in green, blue, and yellow, the lamps will be available in standard sizes ranging from 2" x 2" to 24" x 24". The greatest brightness is obtained from green lamps — the blue and yellow ones are approximately one-half the brightness of green when operated under similar conditions.

Recent improvements in manufacturing techniques and new research developments have resulted in improved brightness and maintained light output. Conservative estimate of rated life is now 5000 hours.

Power consumption is remarkably low — a standard 4" x 4" lamp consumes only 0.07 watt at 120v, 60 cycles.

All lamps are sealed around edges and coated on back with plastic to provide a moisture barrier. In this way, lamps will operate continuously at temperatures up to 122°F in 50% relative humidity, and for shorter periods in up to 98% humidity.

Possible applications include elevator signals, lighted shelves, luminous baseboards, signs, switchplates, darkroom lights, safety lights, and instrument faces. Data, legends, or markings may be silk-screened on glass before processing.

When operated at frequencies higher than 60 cps, the lamps require special auxiliary power supplies. At other than 120v, simple transformers of proper current capacity may be used.

(Rayescent lamps are produced by Lamp Division, Westinghouse Electric Corporation, Dept. PI, Bloomfield, New Jersey.)
Circle 9577 opposite covers.

Positioning switch eliminates lag

Faster and more reliable remote control of pneumatically operated industrial processes is possible with positioning switch that eliminates lags between switch and actuator mechanism.

By using a responsive ball valve instead of a needle valve in the switch, hysteresis, or lag between a switch position change and corresponding air pressure change, has been eliminated.

Switch is used primarily for remote control of pneumatic valves or damper motors. Turning the switch knob gradually increases or decreases the flow of compressed air to these devices, opening or closing them to the desired position. Normally hysteresis is most noticeable when a conventional switch is turned from a higher to a lower position. The air pressure lag may be 1 or 1½ psig, causing an inaccurate positioning of the valve or motor.

To overcome this, a switch must be turned back to a pressure lower than that desired and then turned up to the desired position. This positioning switch produces the correct air pressure change no matter which way the knob is turned.

(Positioning switch is manufactured by Powers Regulator Company, Dept. PI, 3477 Oakton St., Skokie, Ill.)
Circle 9578 opposite covers.

Electronic tachometer for engine speeds 1/5 to 50,000 rpm

For simplified digital measurement of gasoline engine or electric motor speeds, electronic tachometer covers entire range of engine speeds from 1/5 rpm to 50,000 rpm.

Instrument gives simplified digital measure of engine speeds

Unit reads speed to one revolution in 1/10th second; within 10 rpm in 1/100th second, at all speeds. Advantage of indicating rpm continuously (5 legible readings per second with full accuracy) eliminates need of dial tachometers because there are no missed counts or readings, even when momentary speed changes occur.

Instrument is used with low torque, gearless "Rotopulsers"

providing up to 1000 counts per revolution.

Direct digital readout is provided, and signals can be converted to illuminated numbers, visible up to 75 ft away.

(Dynacounter Digital Tachometer is manufactured by Dynapar Corporation, Dept. PI, 5150 Church St., Skokie, Illinois.)

Circle 9579 opposite covers.

Vaportight reflectors are air-cooled

Available in standard dome, shallow dome, deep bowl or angle types, vaportight reflector fixtures are designed for lamps to 200 watts.

Built-in vents completely encircle the entire fixture forcing a moving air stream to flow continually through

Vents force air around entire fixture for cooling

the reflector and out. This "air-conditioning" action helps maintain cooler operation and longer lamp life while sweeping reflectors clean of dust and grime.

Reflectors are vitreous fired porcelain, bonded inside and out to heavy-gauge coated steel in a bright, glazed porcelain enamel finish that will not corrode, scratch, fade or deteriorate.

Complete line of fixtures is fully UL and CSA approved for outdoor and indoor service where seeping moisture, fumes or non-explosive vapors may be damaging.

(Light reflectors are manufactured by Stonco Electric Products Company, Dept. PI, 333 Monroe Ave., Kenilworth, New Jersey.)

Circle 9580 opposite covers.

From full speed to 50% reduction...

draft keeps pace with boiler needs

Located anywhere in the boiler room, motor speed controllers for DeBothezat Induced Draft Bifurcator® Fans permit *complete draft flexibility.*

As draft requirements vary during starting and fluctuating loads, fan speed can be adjusted for optimum boiler performance.

DEPENDABLE . . . COMPACT Direct motor drive eliminates belts. Motor is completely isolated from fumes and heat. This results in such dependable performance, these DeBothezat units are widely used in unattended radio-TV relay towers and pipeline stations.

DeBothezat Induced Draft Bifurcators are available for high pressure boilers delivering up to 60,000 pounds of steam per hour and low pressure boilers delivering up to 190,000 EDR.

11-step controller for single-phase motors. 9-step model for 3-phase motors also available.

Easily installed in breeching inside . . . or in stack outside.

FOR FURTHER INFORMATION SEE OUR LISTING IN SWEET'S PLANT ENGINEERING FILE OR WRITE FOR COPY

De Bothezat™ FANS

A DIVISION OF

American Machine and Metals, Inc.

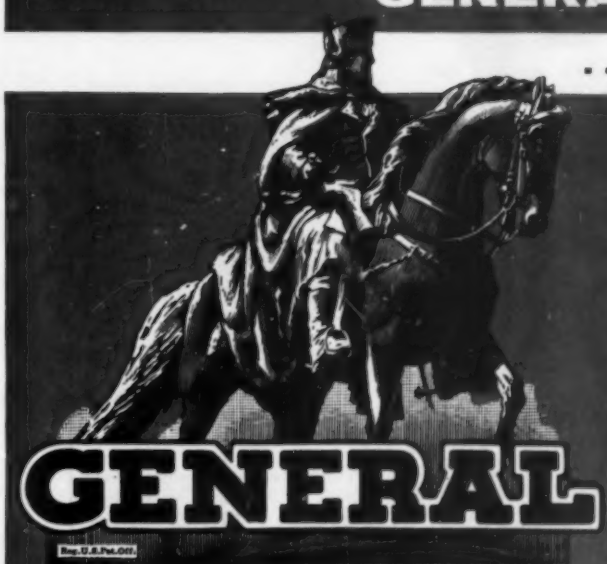
EAST MOLINE, ILLINOIS

IN CANADA: Represented by DOUGLAS ENGINEERING CO., LTD., Toronto and Montreal

Circle 9581 opposite covers.

GENERAL

. . . a trusted name in coal



For many decades, General Coal and its Associated Companies have successfully met the varied needs of all types of coal consumers. You can rely on this experience for all your coal requirements.

WESTMORELAND COAL COMPANY

HAMPTON COAL

STONEGA COKE & COAL COMPANY

GLENBROOK STONEGA RODA

DENDRON CROSSBROOK

JELLICO-HIGHLAND COAL COMPANY

Hazle Brook Premium Anthracite

GENCO ANTHRACITE & BITUMINOUS COALS

General Coal Company

123 SOUTH BROAD STREET, PHILADELPHIA 9, PA.

Branches:

Buffalo Charlotte, N.C. Cincinnati Cleveland Irwin, Pa. New York Norfolk

Circle 9582 opposite covers.

MEASURE
AC and DC
WITH
ONE AMMETER

TONG TEST is the only instrument of its type that measures both alternating and direct current. Press trigger and snap tongs around the electrical conductor for an instant reading, without shutting down equipment. Interchangeable ranges up to 1000 amperes; impossible to read the wrong scale.

Rugged and dependable, safe and accurate. No coils or wires to burn out. Thousands of TONG TEST AMMETERS in use after more than 25 years of active service. Eight types available for conductors up to 3⅜" diameter, or bus bars up to 4½" x ½".

COLUMBIA

Write for illustrated 8-page Catalog PI-400

COLUMBIA ELECTRIC MFG. CO.
4565 Hamilton Avenue • Cleveland 14, Ohio

Circle 9583 opposite covers.

USE THE HANDY READER CARD

(inside covers)

- for more information on articles in this issue
- to have POWER INDUSTRY sent to you regularly
- for more information on "New Developments" and "New Literature"

Compact motor operator for valve, damper control is transistorized

For individual proportional applications, electronic transistorized motor operator is designed for damper and valve control in heating, ventilating and air conditioning systems.

Compactness and simplicity are possible through application of transistor components in electronic circuitry.

Electronic flexibility — choice among sensing elements, selection of compensated control, side adjustability of range and ratio settings — is part of the package.

Virtually self-contained, the simple attachment of a two-wire sensing element to a transistor operator forms a system of electronic control. Connection to any 115v power source completes the installation.

Motor operator operates from 115v power source

The operators are naturally adaptable to year-round control of unitary air conditioners or induction units supplied with hot or chilled water from a central source. Conversion from direct to reverse acting is made by a simple switching operation that may be done manually with a hand switch or automatically by a thermostat sensing change in central system supply water temperature.

Other applications requiring automatic changeover may utilize an outdoor thermostat.

(Transistorized motor operator is product of Barber-Colman Company, Dept. PI, 1300 Rock St., Rockford, Ill.)
Circle 9584 opposite covers.

Uses no sulfuric acid in sulfite analysis of boiler water

Method for determination of sulfite in boiler water eliminates use of 50% sulfuric and starch solution, generally used.

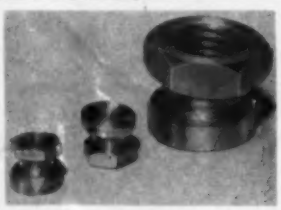
Reagents are replaced by a "dry sulfite indicator."

Procedure to follow is: Water sample should be freshly obtained with as little contact with air as possible. Do not filter. Cool to room temperature.

Measure 100 ml of water sample with a graduated cylinder and transfer to casserole.

One plastic dipperful of dry indicator is added to sample. After stirring, mixture is titrated with potassium iodide-iodate solution until a faint permanent blue color develops in sample. By reading ml of iodide-iodate solution used and following proper calculations, sulfite concentration is determined in ppm SO_3.

(Sulfite determination method is available from Betz Laboratories, Inc., Dept. PI, Gillingham & Worth Sts., Philadelphia 24, Pa.)
Circle 9585 opposite covers.



Toggle pads . . .

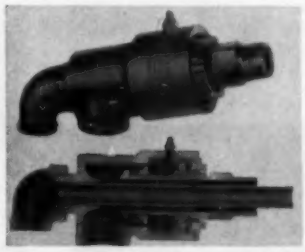
. . . have perfected true-center holding constant at all points of oscillation within 20° (10° each side of 0°) in all directions. Toggle pads incorporate a fixed point in the nut which slides around the contour of a convex spherical section in the pad to provide controlled oscillation. True center of spherical section's center and true center of pad face are located to coincide perfectly.

(Toggle pads are manufactured by Jergens Tool Specialty Co., Dept. PI, 712 E. 163rd St., Cleveland 10, Ohio.)
Check 9586 opposite back cover.

Rotary joints seal automatically to pressure

Giving a revolving sealing connection between a stationary supply pipe and revolving machine cylinder, roll, or drum, connector has a mechanical seal design so that pressures automatically increase or decrease in proportion to fluid pressure of application.

Mechanical sealing is accomplished by two parallel optically flat (within 6 light bands) lapped surfaces running together in an opposite plane in relation to axis of the shaft.



Two types of rotary connectors for dual or single pipe applications

Unit's free floating action and ball bearing construction prevent unnecessary strain and wear on sealing surfaces. A heavy monel metal bellows seal insures full protection against leakage of gases or liquids under pressure, whether unit is idle or in motion.

One type has a dual-pipe connection for syphon duty on installations where both supply and return of gases or liquids are required within the same unit or for syphon drainage of condensate from steam chamber or drum.

Designed to handle steam, water, air, vacuum, industrial fluids and gases on applications to 250 psig, 150 psig steam, and temperatures to 500°F without any adjustments, units are available in five sizes ¼" through 3" with right or left hand threads.

(Rotary Unions are manufactured by Perfecting Service Co., Dept. PI, 332 Atando Ave., Charlotte 6, N.C.)
Circle 9587 opposite covers.

Mobile generator is always on standby

Weighing only 89 pounds, standby engine generator delivers 1500 watts of electric power for AC/DC portable tools.

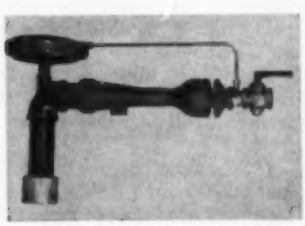
Engine generator weighs 89 pounds

Unit is equipped with an idling control which brings the engine to full speed when power is called for, otherwise the engine runs at a slow idling speed to save fuel and reduce engine wear. Unit is powered by a recoil-starting, four-cycle engine.

(Winco Mite is manufactured by Wincharger Corporation, Subsidiary of Zenith Radio Corp., Dept. PI, Sioux City, Iowa.)
Circle 9588 opposite covers.

Produces stable flame over wide range heat control

Providing industrial or processing heating equipment such as furnaces, air heaters, ovens, and dryers with an extremely wide range of heat control, burner offers 10 to 1 turndown without sacrifice of flame stability. With 10 psig gas, it provides 16 to 1 turndown.



Burner gives 10 to 1 turndown without loss of flame stability

For example, the 2½-inch size provides 1,500,000 Btu per hr with 10 psig gas at high fire — 90,000 Btu per hr at low fire.

A stable flame is assured throughout whole range. Flame is adjusted automatically when the single control valve changes gas input. No other control systems are needed.

Operating under furnace drafts up to 2.0 inch water column and gas pressures from 4 inch water column to 20 psig, burner does not require an air blower.

Capacities range from 120,000 to 1,800,000 Btu/hr for low-pressure series and from 200,000 to 9,300,000 Btu/hr for medium-pressure series.

(HI-LO burner is manufactured by Bryant Industrial Products Corporation, Dept. PI, 17700 Miles Ave., Cleveland 28, Ohio.)
Circle 9589 opposite covers.

Three-in-one . . .

. . . nut driver combines into one handy tool the three most popular nut drivers. Designed to be carried in pocket or tool box, tool contains a #8, 10, 12, nut driver.

("Atom" nut driver is manufactured by Hunter Tool, Dept. PI, P. O. Box 564, Whittier, Calif.)

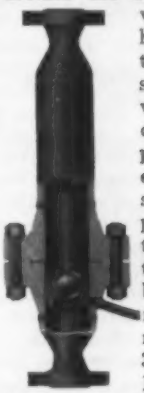
Check 9590 on Reader Service Card.

Desuperheater holds steam temperature constant

Tests with a variable-orifice desuperheater over a wide load range of 50:1 show that reduced steam temperature can be held constant to meet the most rigid quality demands only 20 ft downstream from desuperheater outlet.

No long run of piping is needed to mix cooling water intimately with steam. There are no spray nozzles, traps, glands or stuffing boxes to require maintenance. No atomizing steam is needed.

The unit consists of a section of steel pipe enclosing a self-regulating orifice extending around the full 360° and a weighted ball held in concentric position by springs. Cooling water, under the control of a diaphragm-operated valve responsive to a temperature controller, enters the orifice chamber at a uniform rate of flow around the full 360° periphery.



In operation, the force of steam flowing through the desuperheater raises the ball an amount determined by weight of the ball and amount of steam flow. Each rate of steam flow gives the ball a different position, with a practically constant pressure drop — normally 3 to 4 psig — for all flows.

Cooling water enters the steam at the seat of the orifice, the point of highest pressure drop. With the ball held in concentric position by the springs, the incoming steam flows uniformly around the periphery through which the cooling water is introduced. Introduction of cooling water is further aided by the aspirating effect created by pressure drop in the steam passing through the annular restriction between the ball and ring.

The result is high turbulence regardless of flow rate, with instant and intimate mixing of cooling water into the steam for complete vaporization. Since the desuperheater body is always mounted vertically, water not immediately absorbed remains in suspension until dissipated.

Using standard temperature controller with both proportional and reset features, the unit holds final temperature within plus-or-minus 5°F. Final temperature may be as low as 10°F above saturation.

It is available for pipeline sizes from 2" to 14" and for pressures up to 2500 psig.

(Variable-Orifice desuperheater is manufactured by Copes-Vulcan Division, Blaw-Knox Company, Dept. PI, Erie, Pa.)
Circle 9591 opposite covers.

Measures vibrations

For measuring mechanical vibrations on machinery, portable instrument is compact and light (3¾ lbs).

It is built for a frequency range from 0 up to 250 cps, for accelerations up to 50 g's.

Instrument gives permanent record of machinery vibration

Driven by its own clock work, its time markers are operated by a built-in 6-v battery.

It uses no ink and records by stylus on a waxed-paper tape. The amplitude range is from 0.0001" up to ⅜".

Accessories are available, so that instrument can be used also to measure torsional vibrations on shafts, and even pressure vibrations on liquid or gas-carrying pipes.

(Askania Hand Vibrograph is manufactured by Epic, Inc., Dept. PI, 154 Nassau St., New York 38, N. Y.)
Circle 9592 opposite covers.

Here's
POWER
to clean tubes
from 1/2" to 2"
QUICKLY

Rotojet Junior Tube Cleaners are unusually powerful for their size and weight. They are fed easily through the tubes with the operating hose, and can be shifted quickly from tube to tube. Their convenient size, speed, and ease of operation offer a marked contrast with external cleaners costing many times more.

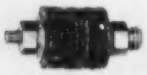
An air valve directly behind the Rotojet motor permits one-man operation. Very little headroom is required, and either vertical or horizontal tubes can be cleaned.

Simplicity of Rotojet design and precision construction assure long service, efficient use of power, and freedom from trouble. Economical brushes, cutters, and scrapers meet practically any requirement.

Send for Bulletin J-410.

Expanding scraper and replaceable element.

Expanding brush and replaceable element.



Sectional wire brush.

Air valve for one-man operation.

ROTOJET®
Junior TUBE CLEANERS

ELLIOTT COMPANY
ROTO PLANT
Tube Cleaner Specialists Since 1910

151 Sussex Avenue, Newark, N. J.

Circle 9593 opposite covers.

Gives direct measurement of carbon monoxide, is pocket size

For detection and direct percentage measurement of carbon monoxide, pocket-size indicator has no electrical circuit and therefore may be used in presence of flammable gases.

Because it indicates percent CO by measurement of the length of a stain developed in an indicating tube, color comparison is eliminated and the visual color response of the operator cannot affect results.

Instrument gives direct readings in percent CO by volume

Carbon monoxide test is made by depressing, then releasing the pushbutton of the instrument's sampling pump, thus drawing controlled sample volume through a replaceable glass indicating tube.

The sealed ends of the tube are broken open just prior to use. The tube contains a yellow-colored CO-sensitive palladium compound impregnated in highly purified silica gel together with a guard gel for removing smoke, fumes, and gases other than carbon monoxide.

Presence of carbon monoxide in the sample tested is shown by development of a brownish-gray stain on the indicating tube's yellow-colored gel. Percent concentration is established by measuring the length of the stain.

This is done by moving the instrument's sliding scale so that its zero line is at the point of deepest stain penetration in the tube. The scale reading at the opposite end of the stain is the percent CO by volume in sample tested.

Indicator has 4 scales — the range of each depends on number of pump strokes. For one pump stroke the scale range is 0.01% to 0.2% CO. Where greater sensitivity is desired the number of pump strokes is increased to 2, 3 or 7.

For seven pump strokes the scale range is 0.005% to 0.03% which permits reading to within 10 ppm CO. Each pump stroke draws a 16 cc sample through the indicating tube.

Instrument can be used in ambient temperatures from −70°F to +125°F. Its indicating tubes may be capped and retained for examination and measurement for periods up to 24 hours.

Instrument measures 5" x 4" x 1½". It is supplied with 12 indicating tubes and 6 tube caps in a metal carrying-case.

(Carbon monoxide indicator is product of Bacharach Industrial Instrument Company, Dept. PI, 200 N. Braddock Ave., Pittsburgh 8, Pa.)
Circle 9594 opposite covers.

Vertical gearmotors rated 1 to 75 hp

Available with either flanged mounting face or with standard vertical extended housing, line of vertical gearmotors are supplied in double or triple reduction units in

Vertical gearmotors come with reductions from 350 to 7½ rpm

ratings from 1 to 75 hp, with reductions from 350 to 7½ rpm.

Built with standard motors in drip-proof, totally enclosed, fan-cooled or explosion-proof enclosures, these units operate at normal torque, on 3 or 2 phase, 60 cycle, 20, 220/440 or 550v.

Special voltages and frequencies as well as mechanical modifications are also available.

(Vertical gearmotors are manufactured by The Lima Electric Motor Co., Inc., a subsidiary of Consolidated Diesel Electric Corporation, Dept. 192, Lima, Ohio.)
Circle 9595 opposite covers.

Cooling towers measure only 44-84" high

Having 15 to 200 gal/min capacity, compact, low-silhouette, general-purpose cooling towers measure — depending on capacity — 44 to 84 inches in height.

Compactness has been made possible through use of multi-finned internal decking constructed of non-corrosive plastic, specially compounded for use in cooling towers. The notched plastic sheets provide four times more water-to-air exposure.

No nozzles are required to effect initial water break-up. Water enters tower-top under a low head of pressure. It flows by gravity down over the multiple plastic decks mounted in two easily removed drawer receptacles at each end of tower. No painting or other surface protection is needed, as all metal parts are hot-dip galvanized after assembly.

Above and between the two decking units is a dynamic-and-static-balanced fan which draws air up through the decking. The weatherproof motor of the belt-driven propeller fan is mounted outside air stream.

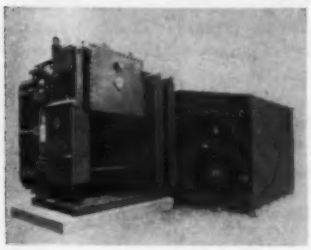
Requiring only a simple mounting foundation, tower's frame in all sizes is rectangular.

(Watertemp cooling tower is manufactured by Binks Manufacturing Co., Dept. PI, 3122 Carroll Ave., Chicago 12, Ill.)
Circle 9596 opposite covers.

Allows outside switchgear to be inspected in bad weather

Switchgear with housing is designed to facilitate preventive maintenance of outdoor units during bad weather.

The switchgear has a sturdy, weather-protected housing with a 75-inch wide aisle which affords protection in all



Exterior of substation with 4.16-kv outdoor horizontal-drawout switchgear with housing

kinds of weather for inspection or on-the-spot maintenance.

Weather-proof work area on a sturdy steel plate floor with built-in, non-sag features makes it possible to check the breakers without exposure to weather and the need for a transfer truck.

The area — with light switch and utility outlet adjacent to doors at either end as well as a light fixture over each breaker — provides control room atmosphere.

The trunnion-mounted potential transformers can be placed over the breaker unit in the superstructure or in an auxiliary cubicle when such is provided.

Current transformers are located in the breaker compartment directly behind a removable metal barrier and in front of the automatic primary disconnect shutters.

The easily assembled aisleway with weatherproof enclosure can be installed in a few hours. Front panel covers — used to protect the meters and inside panels during shipment — are moved out as a unit until the 75-inch wide aisle is formed and the front sill channel rests on pre-set concrete piers.

The wedge plates, door assemblies, roof decks and floor plates are then bolted in place. Finally, the complete unit is firmly secured to the concrete piers.

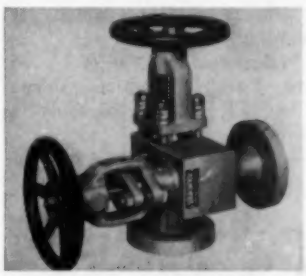
Storm baffles mounted over the switchgear's rear filter-backed louvers provide optimum protection even from driving rains of up to 150 mph velocity.

Condensation is eliminated by means of a thermostatically controlled space heater together with a well-directed air flow throughout equipment.

(Shelter-Clad switchgear is product of Allis-Chalmers Manufacturing Company, Dept. PI, Milwaukee 1, Wis.)
Circle 9597 opposite covers.

Boiler blow-off valve for press. to 665 psi

For boiler blow-off pressures up to 665 psi with basic rated pressure of 400 psi, blow-off valves are available with flange or welding ends, right or left-hand assembly.



Sealing valve has seatless design

A sturdy forged steel block forms a common body for both the hard seat blowing valve and the seatless sealing valve. The hard seat blowing valve is of the Welbond type with an integral welded stellite seat.

This design permits no leakage between seat and body. Valve stem is Type 303 stainless steel which gives adequate protection against pitting.

The sealing valve is of seatless design, which gives positive closing with tight seal.

(Tandem blow-off valve is manufactured by Yarnall-Waring Co., Dept. PI, Philadelphia 18, Pa.)
Circle 9598 opposite covers.

200-hp gearmotors are largest standard units

Two large-size gearmotors rated up to 200 hp feature efficiencies of 94 to 97%, depending upon number of reductions incorporated.

Double, triple and quadruple reductions are available in AGMA ratios ranging up to 440:1.

Final stage helical gearing is carburized and hardened. Gear teeth are precision ground. Large diameter shafting and over-size bearings have sufficient reserve capacity to handle the most severe overhung loads and shock conditions.

Gears, shafting and bearings meet AGMA standards.

Standard NEMA D flanged motors and standard foot-mounted motors are available. Motors with special features can be provided.

(Gearmotor drives are manufactured by Philadelphia Gear Corporation, Dept. PI, 3620 G Street, Philadelphia 34, Pennsylvania.)
Circle 9599 opposite covers.

Glass insulation handles hot and cold piping

Line of low-cost rigid cellular glass insulation handles commercial piping in temperature ranges of 35° to 350°F.

The pipe covering is shipped in 24-inch length, factory-wrapped with a dual purpose kraft and aluminum foil laminate by specially designed equipment. The white laminate serves as a tough protective jacket and gives an attractive finished appearance. It can be painted with a water-based paint if desired.

Due to high compressive strength, the new covering can be installed before or after hanging the pipe. Hangers can go around a fully insulated pipe section without compressing the insulation.

It is not necessary to prime pipe before applying the covering. The 24-inch section opens lengthwise and fits around the pipe. The overlapping longitudinal seam of kraft-foil laminate then is sealed with lapping cement and banded on 12-inch centers. End joints are sealed with factory-furnished, 3-inch vapor barrier strips. Flanges, valves and fittings are insulated with fabricated shapes.

Pipe covering is available in nominal thicknesses of 1" and 1½" for steel pipe or copper tubing ranging from ½" to 6" in size.

(Foamglas Stay-Dry pipe covering is manufactured by Pittsburgh Corning Corporation, Dept. PI, 1 Gateway Center, Pittsburgh 22, Pa.)
Circle 9600 opposite covers.

Makes clamp installation easier and faster

Cutting clamp installation time up to 50%, hand tool is a kind of plier that secures bolt, while clamp is mechanically closed and locked in place.

This frees both hands for attaching nut or for stacking additional clamps into lock position. Misalignment is prevented because proper closure is insured at all times.

Plier holds clamp and bolt in place freeing both hands for attaching nut

Made of forged steel, the tools are being manufactured for the standard No. 8 or No. 10 size bolts at the present time.

(Model #82 plier is manufactured by TA Mfg. Corp., Dept. PI, 4607 Alger Street, Los Angeles, Calif.)
Circle 9601 opposite covers.

NEW LITERATURE

plant services — power services maintenance

Reviews of books and industrial bulletins describing equipment, supplies, services

Pneumatic temperature controls

Recording and indicating pneumatic temperature controls are described in four-page folder.

Instruments constitute simple, rugged method of controlling a wide variety of heating appliances, while also providing temperature indication or recording.

Controls operate in any of ten optional temperature ranges from −30° to 1100°F.

Especially suitable for operation where steam is used as the heating medium, the pneumatic systems are completely self-contained and use no electricity. Being explosion-proof, they may be used in many hazardous locations.

When coupled into an air system the controls actuate an air-operated valve controlling the flow of steam, water or gas, or control other air-operated devices.

Both the recording and indicating controls operate on an air pressure of 3 to 15 psi.

(Bulletin on pneumatic temperature controls is issued by the Partlow Corporation, 509 Campion Rd., New Hartford, New York.)
Circle 9602 opposite covers.

All types of seals

Describing line of precision shaft seals, four-page bulletin contains cutaways on all types.

Ranges for standard types are given. Engineered models are offered for other applications.

(Mechanical seals bulletin is offered by Borg-Warner Mechanical Seals, division of Borg-Warner Corporation, Dept. PI, PO Box 2017, Terminal Annex, Los Angeles 54, California.)
Circle 9603 opposite covers.

Emergency lighting details given

Line of battery-powered, portable and fixed emergency lighting is completely described in catalog.

Line includes sealed-beam spotlights, searchlights, dual-beam search and floodlights, flashing warning signal lights, wide-area lantern-type lights, roof and pedestal mounted searchlights, car and truck beacons, flashers, and reflectors.

All units are illustrated and described.

(Catalog No. 100 is issued by K-S Marine Products, Inc., Dept. PI, Oakville, Conn.)
Circle 9604 opposite covers.

Selection of heating, ventilating units

Heating and ventilating units are available in 12 sizes with capacities ranging from 600 to 73,000 cfm.

Coils used in units are normally mounted in fan section, which will accommodate up to a two-row coil, steam or hot water, large or small face area. For more than one coil, or more than two rows, separate coil section is used.

Featured accessory of new line is automatic air filter which assures constant air delivery at all times, makes filter changing automatic and brings major savings in maintenance costs.

Twenty-page bulletin gives complete information on coil capacities and selection for both steam and hot water. Capacity tables, air resistance charts and rpm and hp tables are given.

(Bulletin #910 is issued by the American Air Filter Co., Inc., Dept. PI, 215 Central Ave., Louisville 8, Ky.)
Circle 9605 opposite covers.

Higher strength plastic pipe

Made from an improved type of resin, rigid plastic pipe is recommended for temperatures up to 180°F and at new higher pressures.

Six-page bulletin gives complete specifications and advantages of line of pipe; describes and pictures typical applications; gives installation information; and includes tables and charts of working pressures, support spacing recommendations, physical properties, and resistance to several dozen common corrosive fluids.

Applications include natural gas lines, food and beverage processing plant piping, radiant heating installations, electric conduit, and deep-jet and submersible-pump well piping.

Plastic pipe is available in sizes from ½ to 6".

(Bulletin HT-100 is issued by Carlon Products Corp., Dept. PI, PO Box 133, Aurora, Illinois.)
Circle 9606 opposite covers.

All kinds of products made of rubber

Abounding in illustrations, 72-page catalog covers all types of rubber products from hose to clothing.

Hoses described are multi-purpose air, water, steam, water suction, and oil suction and discharge, fire and mill.

Clothing includes aprons, raincoats, footwear, gloves, hats, and work suits.

Section on special products covers such things as friction tape, mallets, electrical tape, pump diaphragms, and sheet packing.

(Rubber catalog is issued by the Continental Rubber Works, Dept. PI, Erie, Pa.)
Circle 9607 opposite covers.

Turbine-generators

Describing turbine-generators from 5000 kw to 100,000 kw for industrial and electric utility applications is job of 40-page bulletin.

The booklet is divided into two sections — turbine section and generator section. In the turbine section, standard and special features are described and profusely illustrated.

The section is arranged for easy reference relating to condensing and noncondensing turbines, blading, shrink fitted discs, steam chest, steam seals, nozzles, bearings and rotors.

A complete description is given, with diagrams, of the hydraulic governing system.

Many generator features using air and hydrogen cooling follow.

(Bulletin B-7373 is issued by Westinghouse Electric Corporation, Dept. PI, P. O. Box 2099, Pittsburgh, Pa.)
Circle 9608 opposite covers.

Saturable reactors

Four-page bulletin describes proportioning reactors, transductors, switching reactors, and preamplifiers. The physical and electrical characteristics of the four product lines are given.

Complete dimensional outlines and tables are provided, in addition to instructions for ordering.

(Bulletin C-15-S is issued by Control, a division of Magnetics, Inc., Dept. PI, Butler, Pennsylvania.)
Circle 9609 opposite covers.

Bucket elevators

Line of belt or chain mounted bucket elevators is described in two-page leaflet.

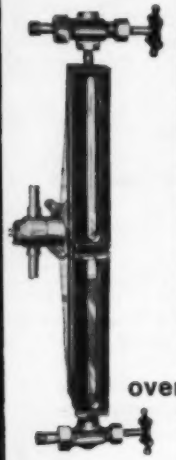
Complete details of mechanical features and materials, as well as table of dimensions and capacities, are given.

("G" series bucket elevator bulletin is isued by The Bucket Elevator Company, Dept. PI, 360 Springfield Ave., Summit, N. J.)
Circle 9610 opposite covers.

NEW!
PENBERTHY ILLUMINATORS
for Liquid Level Gages

58 WATT 3000 HOUR BULB

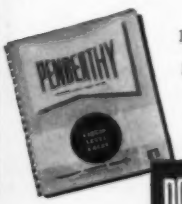
accurate readings



overall illumination
no glare
no blind spots

Faster, more accurate liquid level readings are provided by Penberthy's new, improved, explosion-proof, dust-tight illuminators. 58 Watt Bulb (with medium screw base) gives higher light intensity for 4-times the life of ordinary illuminators. Exclusive rugged aluminum housing over bulb extends bulb life, offers better protection and simplifies relamping. Clear plastic wedge diffuses light over entire length of gage glass.

Illuminators are easily installed on present or new gages. Available in single or double sections, they are used in combination for gages with 3 or more sections. Approved by Underwriters' Laboratories for Class 1, Group C and D hazardous locations.



For further information on Penberthy Illuminators, liquid level gages and valves, write or phone. Ask for Catalog #36.

PENBERTHY

PENBERTHY MANUFACTURING CO.
Division of Buffalo-Eclipse Corporation
1242 Holden Ave., Detroit 2, Michigan

Circle 9611 opposite covers.

Describes three types mechanical air filters

Filter selection tables, charts of engineering data, and performance curves are included in eight-page bulletin describing three types of high-efficiency mechanical air filters.

One filter has closely spaced pleats of filter media with corrugated separators between folds. Separators permit passage of air or gas to full depth of pleats. Filter media is available in asbestos cellulose, glass or ceramic fibers.

Multiple pack filter is a dry-type specially designed to use a wide range of filtering media to obtain practically any degree of air cleaning. It was developed particularly for applications that need higher than normal cleaning efficiencies.

Deep-bed filter is pocket-type, designed to handle dry filtering media of more than usual thickness. It is used in applications requiring a degree of air cleanliness in range of electronic precipitators, but where certain limitations make it impractical to use electrostatic principle.

(Bulletin #238 is issued by American Air Filter Co., Dept. PI, 215 Central Ave., Louisville, Kentucky.)
Circle 9612 opposite covers.

Simplifies selection of breakers

Compact, comprehensive bulletin is designed to aid in selection of molded-case circuit breakers and enclosures.

The eight-page, fold-out bulletin presents construction and performance features, ratings and details on breakers with ratings of 10 through 800 amps and on enclosures for these breakers with NEMA 1 through NEMA 12 classifications.

Master selection chart groups breakers by types and current ratings and lists under each the voltage and interrupting ratings for both AC and DC units.

(Bulletin No. 5004-1A is issued by I-T-E Circuit Breaker Company, Dept. PI, 1900 Hamilton St., Philadelphia 30, Pa.)
Circle 9613 opposite covers.

Some news about fuel burning

Eight-page bulletin describes and lists 11 sizes of oil, gas, and combination gas and oil burners for firing boilers or other heat exchange equipment.

Cutaway burner views are shown in color to visualize the principles of operation resulting in clean, complete burning of even the dirtiest grades of fuel.

Typical burner arrangements are illustrated throughout the bulletin. Fuel consumption ranges are also given.

(Bulletin #1255 is issued by Orr & Sembower, Inc., Dept. PI, Box 1138, Reading, Pa.)
Circle 9614 opposite covers.

Economics of aluminum

Giving a report to the building industry, a 33-page catalog points the dollar advantages of using aluminum in a broad range of conductor and non-conductor applications in the construction of many types of buildings.

Abundant with charts, tables, and graphic pictures, the report is informative and concise.

(The Alcoa report is available from the Aluminum Company of America, Dept. PI, 1368 Alcoa Bldg., Pittsburgh 19, Pa.)
Circle 9615 opposite covers.

Electrical tubing shines like silver

An improved silver-colored, corrosion-resistant finish on electrical metallic tubing is subject of four-page bulletin.

Photographs show results of corrosion tests made in sulfuric acid, sodium hydroxide and salt spray.

Tables list sizes, diameters, weights and data on 45° and 90° elbows.

(Bulletin EMT-958 is issued by Walker Brothers, Dept. PI, Conshohocken, Pa.)
Circle 9616 opposite covers.

FREE
NEW SERIES
HOW-TO-DO-IT ARTICLES
on Commutator and Slip Ring Maintenance

Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

Each article discusses a major part of the overall problem — gives practical tips on maintenance — tells how to solve common problems — what to do and how to do it — in easily read shop language. Supplied in attractive folder, forming complete maintenance data file.

Designed as useful refresher reading and trouble shooting guidance for the veteran maintenance man . . . and a must for the new man just "breaking in" . . . the entire series has been prepared in close consultation with leading, nation-wide engineering authorities.

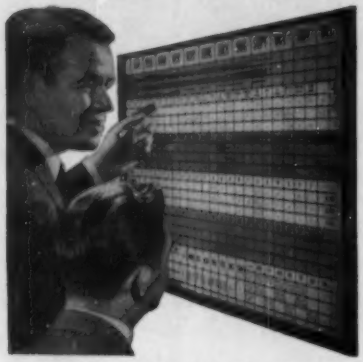
Mail the coupon for Article No. 1 now. Don't miss it — the remainder of the series will be sent to you at regular intervals, free and without obligation.

IDEAL Preventive Maintenance
Everything in equipment and methods for Commutator and Slip Ring Maintenance.

IDEAL INDUSTRIES
1023-C Park Avenue, Sycamore, Illinois
Please send free folder and article No. 1 of series "Commutator and Slip Ring Maintenance."
Name_____
Company_____
Address_____
City_____ Zone____ State_____

Circle 9617 opposite covers.

You Get Things Done With Boardmaster Visual Control



★ Gives Graphic Picture of Your Operations —Spotlighted by Color
★ Facts at a glance — Saves Time, Saves Money, Prevents Errors
★ Simple to operate — Type or Write on Cards, Snap in Grooves
★ Ideal for Production, Traffic, Inventory, Scheduling, Sales, Etc.
★ Made of Metal. Compact and Attractive. Over 350,000 in Use

Complete price $49.50 including cards

FREE 24-Page Booklet No. P-40 Without Obligation

Write for Your Copy Today

GRAPHIC SYSTEMS

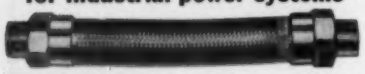
55 West 42nd Street • New York 36, N.Y.

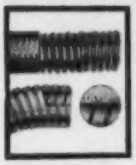
Circle 9618 opposite covers.

COBRA® FLEXIBLE

SEAMLESS METAL HOSE

Custom constructed assemblies for industrial power systems





All sizes in bronze, stainless or carbon steel, monel, inconel and low carbon nickel. Seamless spiral or parallel corrugation... Braided. All type of fittings and flanges welded, brazed or soldered. Also, interlocked hose.

write — wire — phone: RE 7-3311 ...for prices and catalogs

COBRA METAL HOSE

5099 S. Kedzie Ave. • Chicago 32, Ill.

Circle 9619 opposite covers.

Industrial lighting problems solved

Twenty-one case histories show how line of fluorescent lamps are lighting a complete range of industrial operations — everything from a junkyard to fine electronic assembly work.

Lighting layout, as well as technical and cost data, are shown for each case history.

("21 Industrial Lighting Problems Solved with Power Groove" is issued by Large Lamp Department, General Electric Co., Dept. PI, Nela Park, Cleveland 12, Ohio.)
Circle 9620 opposite covers.

Outdoor plastic marking

A plastic laminate printed marking is the subject of two-page bulletin. It has outstanding weathering characteristics for fabricated instruction and warning plates, lube charts and signs.

This new plastic laminate has just been released after three years of extensive research.

The laminate is also scratch resistant and impervious to humidity, salt spray and ultraviolet rays.

(Bulletin AR-1 is issued by the Duralith Corporation, Dept. PI, 1025 Race Street, Philadelphia 7, Pa.)
Circle 9621 opposite covers.

Dry and liquid transformers

Complete engineering information on entire line of dry- and liquid-filled transformers is given in catalog.

Pictures, drawings, and data are included.

Printed in loose-leaf form, additional sheets can be inserted with ease.

(Transformer catalog is issued by the Marcus Transformer Co., Inc., Dept. PI, Rahway, N. J.)
Circle 9622 opposite covers.

About deaeration and tray type heaters

Helpful aid to engineers in all types of industries using deaerating heaters is contained in 12-page bulletin.

Booklet covers principles of deaeration, tray heater operation, standard heater design and applications, accessory equipment, and design and fabrication of tray utility heaters.

Section on design features discusses load variations, installation, metallurgy and construction of trays, and vent condensers.

Illustrations include cutaway drawings of typical tray and utility tray heaters.

(Bulletin WC-106A is issued by Graver Water Conditioning Co., Dept. PI, 216 West 14th St., New York 11, N.Y.)
Circle 9623 opposite covers.

Catalogs instruments for quick shipment

Discussing instruments available for quick shipment, 52-page catalog covers such units as indicators, transmitters, recorders and controllers for flow, pressure, temperature, density, viscosity and consistency.

Each instrument is completely described and specified. In addition, there are numerous photographs, charts, and graphs.

There are also nomographs for sizing variable-area flowmeters.

(Catalog 2 is available from Fischer & Porter Co., Dept. PI, 941 Jacksonville Rd., Hatboro, Pa.)
Circle 9624 opposite covers.

For more information on items reported in the New Literature section circle corresponding numbers on reader service card opposite back cover.

Shows Ni-Cd batteries

A four-page, colored and illustrated brochure, highlights the features, design potentials and specifications of the nickel-cadmium, button-cell battery line which includes types from 100 MAH to 1750 MAH capacities in 50 distinct sizes and voltages.

(Bul. #VO-110 is available from Alkaline Battery Division, Gulton Industries, Inc., Dept. PI, Metuchen, N. J.)
Circle 9625 opposite covers.

How to heat water

Construction and operating data for hot water heating convertors are the subject of 12-page bulletin.

Easy-to-read tables show how to select proper convertors for applications in industrial and domestic water heating.

Included are product dimensions, connections, operating capacities, temperatures, and pressure losses covering usual ranges for standard water heating systems and general ranges for radiant heating systems (zero to 15 psi steam pressure).

(Bul #303-A may be obtained by writing Patterson-Kelley Co., Inc., Dept. PI, East Stroudsburg, Pa.)
Circle 9626 opposite covers.

Vortex type burners

Detailed descriptions are given of expanded line of vortex type burners. Four-page bulletin includes capacities and dimensions for six standard models with output range up to 50 million Btu per hour.

Photos show very short flame characteristic of the burner in the open air, firing No. 6 fuel oil and firing gas.

(Bulletin #116 is issued by Thermal Research & Engineering Corp., Dept. PI, Conshohocken, Pa.)
Circle 9627 opposite covers.

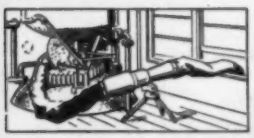
Ventilate CONFINED Places with Vano Design "C" Ventilator-Exhauster

WELDING FUMES are here removed by this Vano Ventilator-Exhauster.

Ideal for withdrawing welding fumes from confined places or directly from the welding rod. Provides greater safety, greater comfort for workers . . . leads to greater work efficiency. Can be furnished with 8" suction inlet to which 8" non-collapsible suction tubing may be attached . . . or provided with multiple inlet nozzles for 5", 4" and 3" suction hose.

Other types are also available for supplying fresh air to men working in confined places, such as tanks, manholes, drums, boilers and shipholds.

For full details on Coppus Vano Design "C" Ventilator-Exhauster write COPPUS ENGINEERING CORPORATION, 183 Park Ave. Worcester 2, Mass.



FUMES FROM A REACTOR KETTLE are here withdrawn by tripod-mounted Vano Ventilator-Exhauster. Note non-collapsible suction tubing and discharge tubing.

ANOTHER COPPUS "BLUE RIBBON" PRODUCT

Circle 9628 opposite covers.

TRAPS 2566

COMPRESSED AIR

Murphy Ball Float Traps, Inverted Bucket Traps, Zip Action Traps, and Thermotraps provide automatic ejection of condensate for any pipeline capacity or pressure, and regardless of atmospheric temperature.

Write now for FREE Data Sheet No. 2566.

JAMCO

JAS. A. MURPHY & CO., INC.

1419 EAST HIGH STREET, HAMILTON, OHIO

Circle 9629 opposite covers.

CUT HERE AND FILE

POWER PLANT & POWER SERVICES INDUSTRY

1959 location chart for figuring power plant costs

power plant costs

JOHN W. BISHOP
Mechanical Engineer
Power Generating Section Bureau of Yards and Docks
U.S. Navy Department
and POWER INDUSTRY advisory editor

Here are the 1959 cost-estimating location factors to use with previously published charts (pages 18-21, December 1956) for quick estimations of power plant costs. The table below replaces the 1958 factors (page 32, March 1958).

Since the original charts appeared in December 1956, they are again presented on page 31 of this issue for those who do not have them. The top chart helps you estimate boiler plant costs; the lower one covers steam-electric plant costs.

Both involved a location factor to adjust for labor, materials, overhead, and profit in your vicinity.

Lines with arrows on the charts point out method to follow for obtaining estimated costs.

Note that construction costs for plants outside the immediate vicinity of locations shown must be adjusted for differences in local freight and labor costs.

Quick estimate for your power plant costs – 1959

Area	Location Factor	Area	Location Factor
Albany, Schenectady, Troy, N. Y.	1.12	Miami, Fla.	1.14
Albuquerque, N. M.	1.22	Milwaukee, Wis.	1.10
Atlanta, Ga.	1.05	Newark, Elizabeth, Jersey Cty., N. J.	1.25
Baltimore, Md.	1.06	New Haven, Conn.	1.16
Birmingham, Ala.	1.03	New Orleans, La.	1.10
Boston, Mass.	1.17	New York City, N. Y.	1.24
Buffalo, N. Y.	1.13	Norfolk, Va.	1.07
Chicago, Ill.	1.15	Omaha, Nebr.	1.16
Cincinnati, Ohio	1.11	Philadelphia, Pa.	1.11
Cleveland, Ohio	1.17	Phoenix, Ariz.	1.24
Columbus, Ohio	1.08	Pittsburgh, Pa.	1.11
Dallas, Texas	1.18	Rochester, N. Y.	1.15
Denver, Colo.	1.22	Rock Island, Moline, Ill.	1.11
Des Moines, Iowa	1.17	St. Louis, Mo.	1.17
Detroit, Mich.	1.18	Salt Lake City, Utah	1.21
El Paso, Texas	1.17	San Antonio, Texas	1.12
Houston, Texas	1.15	San Francisco, Calif.	1.24
Indianapolis, Ind.	1.11	Savannah, Ga.	1.04
Jackson, Miss.	1.06	Seattle, Wash.	1.15
Jacksonville, Fla.	1.04	Spokane, Wash.	1.14
Kansas City, Mo.	1.14	Springfield, Ill.	1.12
Los Angeles, Calif.	1.21	Tulsa, Okla.	1.16
Memphis, Tenn.	1.04	Washington, D. C.	1.13

Electrical insulation uses synthetic fiber

Technical data covering electrical and physical properties of a flexible coated insulation is presented in four-page brochure.

Brochure explains why varnished polyester web has increased conformability and dielectric properties. Drawings illustrate performance of woven cloths and the non-woven polyester material, showing difference in physical properties.

("Fibremat" insulation brochure is issued by Dept. D8-342, Irvington Division, Minnesota Mining & Manufacturing Co., Dept. PI, 900 Bush St., St. Paul 6, Minn.)
Circle 9630 opposite covers.

Overhead conveyor uses shown

Twelve-page catalog contains typical installations and layouts together with complete engineering specifications for lowcost, overhead conveyor systems.

Conveyors are designed to meet demand for handling of any type of intermediate load in a variety of applications.

(Overhead conveyor is issued by Chainveyor Corporation, Dept. PI, 5618 E. Washington Blvd., Los Angeles 22, Calif.)
Circle 9656 opposite covers.

Photoelectric control for outdoor lighting

Four-page bulletin describes control elements, hoods, and relays included in line of photoelectric equipment for outdoor lighting circuits.

Application data, product descriptions, features, and operating data are included for each of the units in the line.

(Bulletin GEC-1524 is issued by General Electric Company, Dept. PI, Schenectady 5, N.Y.)
Circle 9631 opposite covers.

Gives specifications on plastic piping

Polyvinyl chloride piping, fittings, and valves — of both normal and high impact material — is the subject of six-page fold-out bulletin.

Catalog lists complete specifications and physical properties of piping and includes data about common chemicals that can be safely handled by the plastic.

(Catalog #10050-A is issued by the B. F. Goodrich Co., Dept. PI, Akron, Ohio.)
Circle 9632 opposite covers.

Catalogs wiring devices

Full of illustrations and pertinent information, pocket-size catalog describes all kinds of wiring devices.

Devices cataloged include three wire "U" device, grounding devices, interchange devices, switches, receptacles, wall plates, weather-proof devices, locking devices, fuses, sockets, armored caps and connectors.

(Wiring device catalog is issued by Eagle Electric Mfg. Co., Inc., Dept. PI, 23-10 Bridge Plaza South, Long Island City 1, N.Y.)
Circle 9633 opposite covers.

Fifty-nine ideas for modernization in '59

Six criteria were set up for selection of modernization ideas in 20-page booklet. Each of 59 ideas must have improved operating efficiency, increased production, improved safety, lowered capital expenditure costs, eliminated a maintenance problem, or improved working conditions.

More information on any idea is available through request card.

(Copies of modernization idea booklet are available by writing directly to Allis-Chalmers Manufacturing Co., Box 512, Milwaukee 1, Wis.)
Circle 9634 opposite covers.

Bonds new concrete to old

A high-strength adhesive that bonds wide range of materials to each other or to dissimilar materials has been developed.

It is especially recommended for bonding new concrete to old. In bonding concrete, the adhesive provides positive seal that prevents moisture from seeping in around joints and causing spalling, slaking and gradual disintegration of patched area.

(Technical Sales Bulletin No. 348 is issued by The Ceilcote Company, Dept. PI, 4891 Ridge Road, Cleveland 9, O.)
Circle 9635 opposite covers.

Shows over 100 air motors

Containing 16 pages, two-color bulletin discusses over 100 air motors.

Units cover power range from 0.3 to 24 hp, with speeds running from 50 to 2580 rpm.

Eight illustrated case histories are included, together with a typical power curve and information on remote control of these motors.

(Form 5072A is issued by Ingersoll-Rand, Dept. PI, 11 Broadway, New York 4, N.Y.)
Circle 9636 opposite covers.

Valve actuators

A 22-page brochure called "The Plug Valve Actuator Blue Book" has just been released.

It gives data on plug valve actuators up to 12 inches. Brochure also includes specifications, dimensions and torque information. Revised and expanded selection tables are also given.

(Plug Valve Actuator Blue Book is issued by the Pantex Manufacturing Corporation, Dept. PI, PO Box 660, Pawtucket, R. I.)
Circle 9637 opposite covers.

Electric hoists

Complete line of electric hoists including three new larger capacity and higher speed models recently introduced is the subject of 12-page bulletin.

Complete listing of hoists available in capacities from ⅛ to 2 tons with a wider range in lifting speeds are included. Charts and photos of models are also supplied.

(Bulletin 158-G is issued by the Chisholm-Moore Hoist Division, Dept. PI, Tonawanda, New York.)
Circle 9638 opposite covers.

Gas regulators

Complete line of cylinder, manifold, and station pressure regulators for gas is covered in 36-page catalog.

Illustrated booklet contains flow and pressure specifications, as well as inlet and outlet connection dimensions, for each regulator.

Adapters, station valves, flowmeters, hose connections and pressure gauges are also described in detail.

(Catalog ADC 705F is issued by Air Reduction Sales Co., Dept. PI, 150 East 42nd St., New York 17, N. Y.)
Circle 9639 opposite covers.

All you want to know about steam traps

From proper steam trapping selection to installation and maintenance, 50-page book covers subject of steam traps.

Resplendent with photographs, tables and cutaways, the catalog covers other subjects such as selection, sizing, and how to trap steam mains, steam purifiers, separators, pipe coils, and unit heaters.

Types of traps discussed include: open float and thermostatic, side inlet, bottom inlet, forged steel, and compound traps.

(Catalog K is issued by Armstrong Machine Works, Dept. PI, Three Rivers, Mich.)
Circle 9640 opposite covers.

NOW!
SAFER STRONGER 300-POUND
BRONZE GATE VALVES

WITH NEW CYLINDRICAL BODY SHAPE

Here's a bronze gate valve with a new body shape giving increased strength against both internal pressures and piping strains . . . with huskier, wider hex ends that give a firmer wrench grip. Improvements inside these valves include high wear-resisting Exelloy steel (12% chromium), expanded-type body rings and easy-to-replace hard bronze disc that takes normal seating wear. Priced no higher than bronze valves with integral seats. Sizes ¼ to 3 in.; rising and non-rising stem types.

Get full facts on these more durable, maintenance-saving valves. Ask for Circular AD-2340.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill.
Branches and Wholesalers Serving All Areas

Circle 9641 opposite covers.

2 NEW LINES FROM U.S. GAUGE

1. "A" Line Pressure Gauges

Premium gauge construction, at up to 40% below premium price!

Most A.S.A. Grade A Standards. Accurate to within 1% of scale range for middle (working) half of scale—1½ % for remainder.

Wide choice of options. Variety of cases (aluminum standard), mountings, movements, Bourdon tubes. Dial sizes 3½ to 12 inches. Pressures to 10,000 psi.

Long life, easy maintenance. Extra rugged. Superior USG design. Entire gauge internals can be removed as a unit for inspection or calibration.

Write for Catalog 305.

2. Supertherm Dial Thermometers

Now, one comprehensive line from one source, offering:

Direct or remote reading. Mercury, organic liquid, vapor or gas fills for temperature measurement from —350° to 1000° F. **Remote:** up to 125 feet from indicator. **Direct:** rigid-mounting thermometers, or "Multi-Angle" that can be adjusted to any practical mounting angle.

Widest possible choice. Full range of bulb shapes, sizes and materials, and case designs. Cases in phenolic or aluminum. Sizes from 3½ to 8½ inches.

Write for Catalog 205.

UNITED STATES GAUGE
DIVISION OF AMERICAN MACHINE AND METALS, INC., SELLERSVILLE, PA.

Find Your Nearest Distributor in the "Yellow Pages"

Circle 9642 opposite covers.

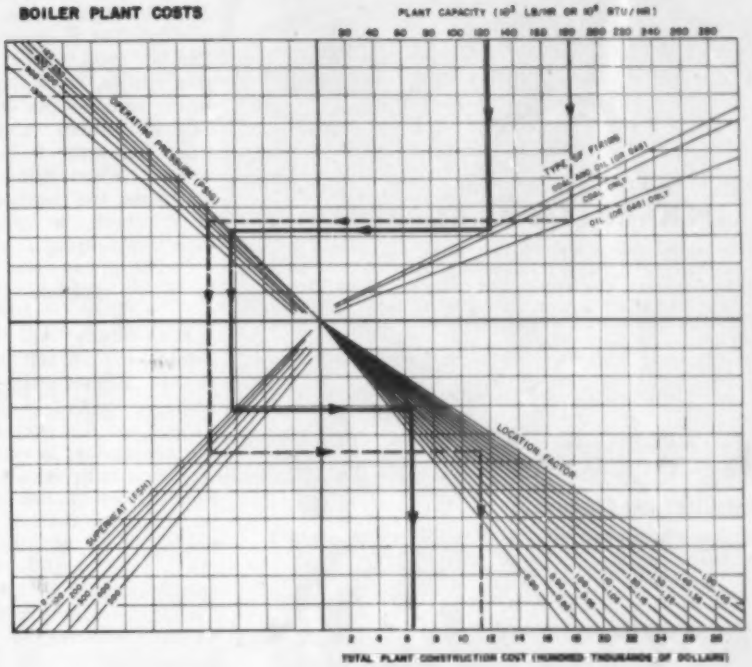
---CUT HERE AND FILE---

POWER PLANT & POWER SERVICES INDUSTRY

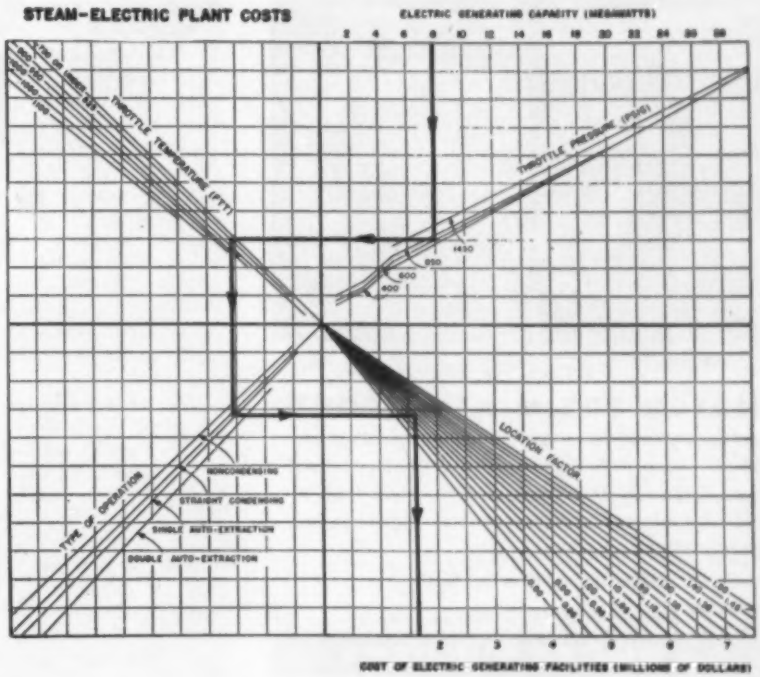
nomograph 19

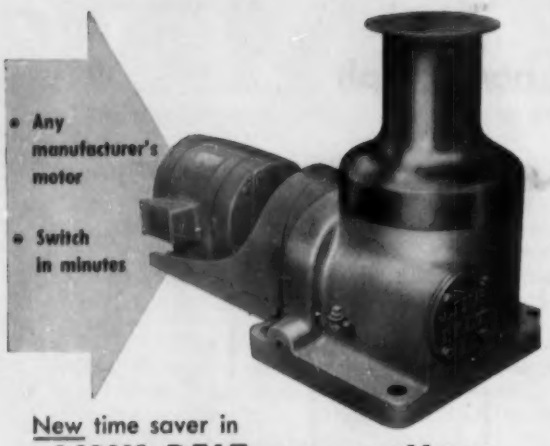
power plant costs (from page 29)

BOILER PLANT COSTS


PLANT CAPACITY (10³ LB/HR OR 10⁶ BTU/HR)
OPERATING PRESSURE (PSIG)
TYPE OF FIRING
SUPERHEAT (°F)
LOCATION FACTOR
TOTAL PLANT CONSTRUCTION COST (HUNDRED THOUSANDS OF DOLLARS)

STEAM-ELECTRIC PLANT COSTS





New time saver in

LINK-BELT car spotters

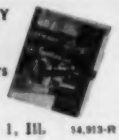
Here's an exclusive feature that gives Link-Belt Car Spotters new flexibility . . . a motor mount bracket that accepts any manufacturer's foot-mounted, hoist type motor. You slash delays in making motor replacements. No re-alignment problems either—sturdy bracket design assures accurate positioning.

Motor mount bracket type car spotters are available in both 5 and 10 hp sizes . . . furnish enough pull to move six loaded freight cars. A full range of accessories can be furnished.

LINK-BELT

CAR SPOTTERS AND CAR PULLERS

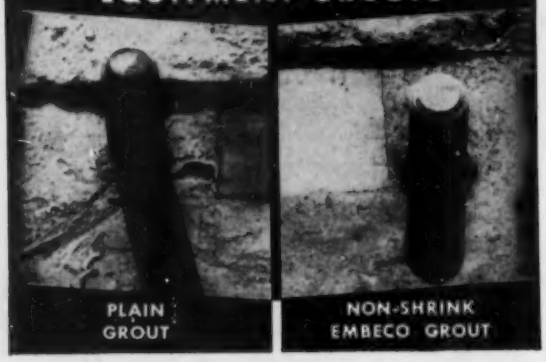
WRITE TODAY for complete information on car spotters and pullers.



Link-Belt Company, Prudential Plaza, Chicago 1, Ill. 14.913-R

Circle 9643 opposite covers.

COMPARE EQUIPMENT GROUTS



. . . And You'll See Why

EMBECO PRE-MIXED GROUT

gives *lasting* results on every equipment grouting job. Add only water to Embeco Pre-Mixed Grout, mix and place. Obtain a *flowable, non-shrink* grout that insures full bedplate contact, maintains alignment, has high impact resistance.

Write for Free Grouting Guide

DIVISION OF AMERICAN-MARIETTA COMPANY

the MASTER BUILDERS co.

CLEVELAND 3, OHIO TORONTO 9, ONTARIO

Circle 9644 opposite covers.

Space-age Testing

From page 17

"stand-by".

The boiler for heating the water, which in turn heats the brine through a heat exchanger, is an oil-fired copper tube boiler with automatic controls. Water is heated and circulated at a constant 180°F. The hot brine system, like the cold system, has a flow switch which actuates the water circulating pump and boiler when hot brine is being circulated. When brine circulation stops, the pump and boiler is cut off the line to prevent overheating.

Controls

Temperature and humidity control of each cell is accomplished automatically by dynalog recorders, solenoid valves and by wet and dry thermocouples in each cell. The dry bulb is wired to a recorder which has an index at which the desired temperature can be set. The recorder in turn controls the flow regulator through GN_2 lines. Thus, by throttling the flow of brine flowing at a fixed temperature (−65°F for cold; +180°F for hot) the dry temperature on the cell can be regulated.

When the cells are being conditioned, air is constantly being circulated by the blower, and the shutters which separate the air duct are open. The wet bulb, through a recorder, controls a fog nozzle which sprays water in a fine mist in the cells. This recorder is also provided with an index at which a desired wet temperature can be set. This opens and closes a solenoid valve in the water line to the fog nozzle.

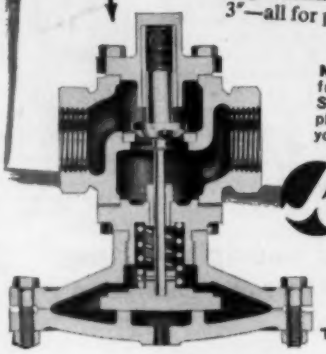
The cells have three types of door operation. Two are GN_2-actuated and the other is hydraulic. All doors can be operated by control buttons outside the cells and remotely at the control center. Conditioning of each cell stops when the front doors are opened automatically. Through a system of micro-switches and relays, the shutters close, the air blower stops, and the gate

To page 34

Valve assembly floats

...in this JOHNSON DIAPHRAGM VALVE

Yes, this diaphragm valve has the same floating-action valve assembly perfected in Johnson Solenoid Valves. Valve seat is not tied to push rod...is free to find its own leak-tight seat with each closing. Ideal for steam and water service. Designed especially to team up with Johnson Solenoid Valves ...to provide a quick-acting, heavy duty automatic valve for high-pressure large-capacity requirements. Sizes 2", 2½" & 3"—all for pressures to 250 psi.



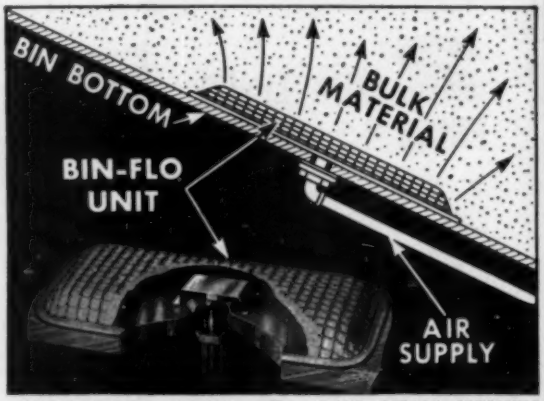
New Bulletin "V" has full data on Johnson Solenoid and Diaphragm Valves; write for your copy.

THE JOHNSON CORPORATION

807 Wood Street

Three Rivers, Michigan

Circle 9645 opposite covers.



BIN-FLO USES SMALL VOLUME OF AIR AT LOW PRESSURE

KEEPS BULK MATERIALS MOVING

BIN-FLO units in bins, chutes, hoppers, etc., restore flow characteristics to dry, finely ground materials which tend to pack or bridge in storage. Types for all materials and conditions. No moving parts; simple installation; negligible operating cost; no maintenance cost.

BIN-DICATOR the original diaphragm-type bin level indicator. In successful use for over 20 years. **ROTO-BIN-DICATOR** new, motor-driven paddle type; excellent on bins under pressure or vacuum, and for general application. Also explosion-proof units, U.L. listed.

THE BIN-DICATOR CO.

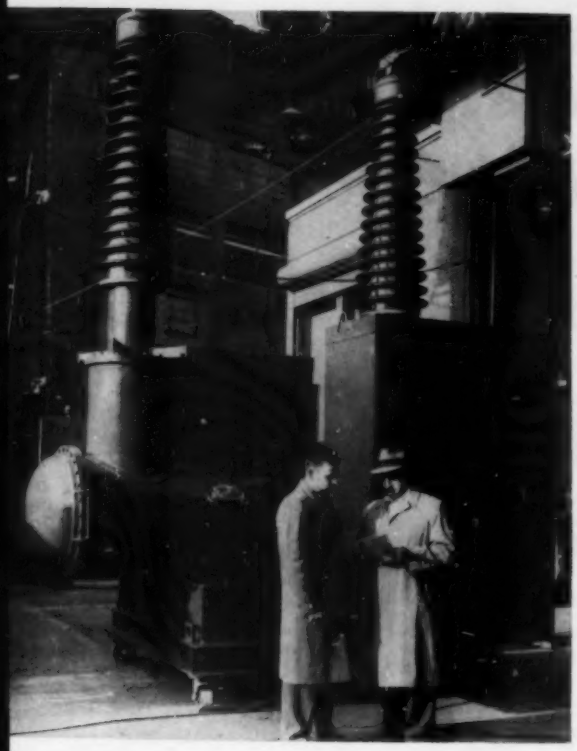
13946-V2 Kercheval • Detroit 15, Mich.

Write for detailed literature or call VAlley 2-6952

WE SELL DIRECT • PHONE ORDERS COLLECT

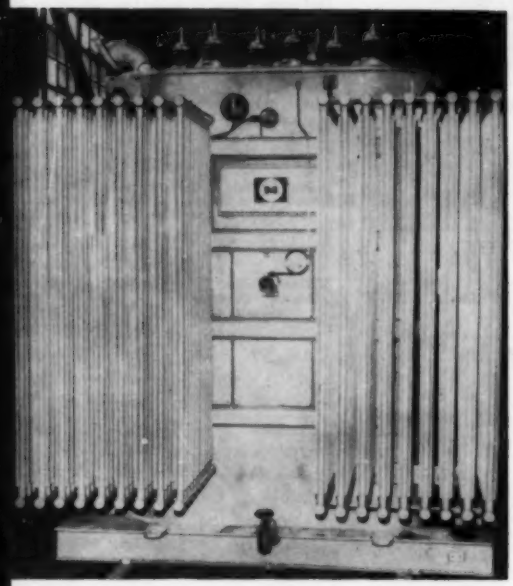
Circle 9646 opposite covers.

PHOTO NEWS

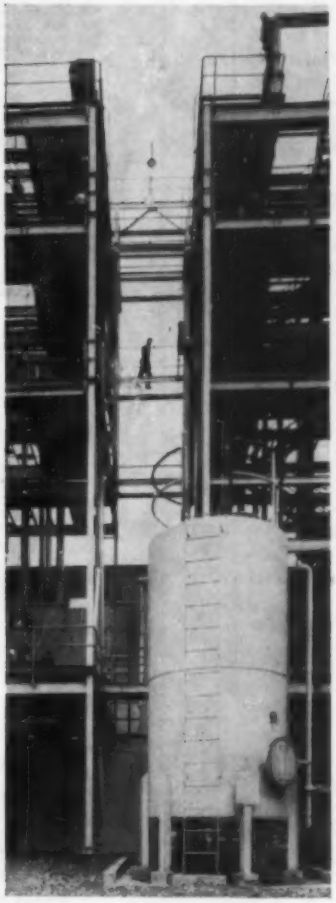


◀ FIRST 230-KV, 15,000-MVA SULFUR HEXAFLUORIDE circuit breaker built by Westinghouse will be installed on Pennsylvania Power and Light Co.'s system in mid-1960. Use of SF_6 gas results in lighter foundation requirements and self-contained unit that does not exhaust to atmosphere.

GIANT-SIZE STAINLESS FITTINGS ▶ will transmit high-purity water at Commonwealth Edison's Dresden Nuclear Power Station. Ranging from 10" to 22" in diameter, the fittings are fabricated of 304 stainless steel or of carbon steel clad with 304. Here one of the fittings is being checked with fluid penetrant to assure absence of flaws at plant of manufacturer, W-K-M division of ACF Industries, Inc., Houston, Texas.



▲ FIRST ALL-ALUMINUM POWER TRANSFORMER has been produced by Moloney Eletcric Company, St. Louis, Mo., for Aluminum Company of America. With a design capacity of 3750 kva, the transformer uses aluminum for all metal parts except the core and trucks. Taller than a one-story building, it will ultimately serve one of America's largest hydraulic extrusion presses.



WALKING ON AIR? It would certainly seem that the attendant at the Humboldt Bay Power Plant of Pacific Gas and Electric Co. was standing in the middle of a fourth level "open floor" walkway. Actually, it's just an illusion created by the sun. He is standing on walkway fabricated of Blaw-Knox grating which is electro-forged for strength and permanence. ▶

▲ THERMOELECTRIC GENERATOR with an operating efficiency of about 6 percent uses heat applied to semi-conducting materials to generate electricity. This five-watt unit is intended for use with an isotope heat source. Additional types are planned — manufacturer states that units could conceivably range from ½ watt to several thousand watts.

(Thermoelectric generators are manufactured by Minnesota Mining and Manufacturing Co., Dept. PI, 900 Bush Street, St. Paul 6, Minn.)
Check 9647 on Reader Service Card.

From page 32

valves leading to and from the heat exchanger closes the moment the door opens.

In the air duct of the cells, an air flow switch is provided which is interlocked to the gate valves controlling brine flow to the heat exchanger. When air is being circulated, the flow switch is actuated, allowing the gate valves to open.

The gate valves close the moment air circulation is stopped. The air circulating blower is so devised that it will not start unless the doors are closed. Access to the cells during environmental preparation is provided through small hand-operated side doors. Close by are fresh-air-supply lines with quick-disconnect fittings for air breathing apparatus and suits. For safety reasons protective equipment must be used for entering any of the closed chambers.

Rainfall spray nozzles are well spaced on top of the cells to cover the entire box. An orifice is provided and calibrated to measure the amount of "rain" being delivered. The amount is controlled by a hand-operated valve upstream of the orifice.

Safety Controls

When the chambers are in operation a continuous sampling of the air is made automatically by an explosion and toxic meter. Should the air inside the chamber become contaminated with an explosive or toxic mixture, an alarm is set off inside the chambers and in the general area. This safety feature is provided for the chambers, aside from the fresh air supply connections that personnel must use when entering.

The fuel in storage in two spheres at the back of the chambers is also conditioned by circulation to a shell-and-tube type heat exchanger. The temperature is controlled in the same manner as the chamber temperatures — by regulating the flow of brine into the heat exchangers. Fuel is circulated continuously by a pump. Through a system of interlocks, the circulation system and piping is isolated the moment the spheres are pressurized for testing.

All pipings, boxes and accessory equipment are well insulated to reduce the heat leakage. Insulation is protected from the elements by aluminum jackets. Around the chambers, where the system may be subjected to a high temperature while firing, a special insulation is used. ■

Principal Equipment in Rocketdyne's Test Labs

BACK PRESSURE REGULATOR
Back pressure regulator is manufactured by Fisher Governor Co., Dept. PI, 1700 Fisher Bldg., Marshalltown, Iowa.
Check 9648 on Reader Service Card.

GN_2 PRESSURE-OPERATED GATE VALVES
GN_2 pressure-operated valves are manufactured by M. Greenberg Sons, Dept. PI, 767 Folsom St., San Francisco, Calif.
Check 9649 on Reader Service Card.
Gate valves are operated by GN_2 cylinders which are manufactured by Leeden Manufacturing Co., Dept. PI, 16th and San Pedro Sts., Los Angeles, Calif.
Check 9650 on Reader Service Card.

REFRIGERATION SYSTEM
Refrigeration system is manufactured by the York Refrigeration Co., Dept. PI, Roosevelt & Thomas Sts., York, Pa.
Check 9651 on Reader Service Card.

BOILER
Boiler is manufactured by Bryan Steam Corp., Dept. PI, 5501 Chili Pike, Peru, Ind.
Check 9652 on Reader Service Card.

AIR SAMPLING METER
Air sampling meter is manufactured by Mine Safety Appliance Co., Dept. PI, 230 N. Braddock Ave., Pittsburgh 8, Pa.
Check 9653 on Reader Service Card.

advertisers' index

A
Armstrong Machine Works 11

B
Barksdale Valves, Pressure Switch Division 9
Bin-Dicator Co., The 32
Bird-Archer Company, The 4
Boiler Tube Company of America 19

C
Cobra Metal Hose 28
Columbia Electric Mfg. Co. 22
Coppus Engineering Corporation 29
Crane Co. 31

D
DeBothezat Fans Division, American Machine and Metals, Inc. 21
Detroit Stoker Company 5

E
Elliott Company — Roto Plant 24

F
Federal Sign and Signal Corporation 12
Fly Ash Arrestor Corporation 8
Fuller Company, Subsidiary of General American Transportation Corporation 7

G
General Coal Company 21
Graphic Systems 28

I
Ideal Industries 27

J
Johnson Corporation, The 32

K
Kirk & Blum Mfg. Co., The 10

L
Link-Belt Company 32

M
Manzel, A Unit of Houdaille Industries, Inc. 12
Master Builders Co., The, Division of American-Marietta Company 32
Morton Salt Company, Industrial Division ..... 4th Cover
Murphy & Co., Inc., Jas. A. 29

N
New York & New Jersey Lubricant Company 12

O
Onan & Sons, Inc., D. W. 8
Orr & Sembower, Inc. ..... 3rd Cover

P
Penberthy Manufacturing Co., Division of Buffalo-Eclipse Corporation 27
Putman Publishing Company 22

S
Schaub Engineering Company, Fred H. 6
Smith Corporation, A. O. 19

U
United Electric Coal Companies, The 15
United States Gauge, Division of American Machine and Metals, Inc. 31

W
Wickes Boiler Co., Division of the Wickes Corporation ..... 2nd Cover

Advertising Representatives

RICHARD H. PUTMAN — Sales Manager
FRED S. BRANDT — Eastern Sales Manager

CHICAGO 11, ILLINOIS, Richard H. Putman, 111 East Delaware Place, WHitehall 4-6141

LOS ANGELES 57, CALIFORNIA, Bob Wettstein & Associates, 672 S. Lafayette Park Place, DUnkirk 8-2286

NEW YORK 17, NEW YORK, Fred S. Brandt, William J. Probovich, 369 Lexington Avenue, MUrray Hill 6-7738

PORTLAND 5, OREGON, Bob Wettstein & Associates, 337 Pittock Block, 921 SW Washington St., CApitol 8-4107

SAN FRANCISCO 8, CALIFORNIA, Bob Wettstein & Associates, Jerry Nowell, Gene Watts, 355 Stockton St., YUkon 2-9537

SOUTHEASTERN STATES, Joe H. Howell, 40 Peachtree Place, N.W., Atlanta 9, Georgia TRinity 2-2235

THAT'S INTERESTING

t's a dirty world

Man's days on earth are umbered if he keeps dirty- ng-up his planet, according to Dr. Rex H. Wilson, medical director of The B. F. Good- ich Co.

Humans have the "unfortu- ate ability" to contaminate verything with which they ome in contact. "Science ust teach us how to decon- aminate ourselves and our urroundings. If not, we will ventually find our world so olluted that we cannot live n it."

"It is no longer news that an-made smog can be con- tantly annoying and occa- ionally lethal. The fact that very large city in the world ay be plagued with these hree conditions in the future, owever, creates a problem for e physician as well as the ir pollution control scientist."

ounds "Pat"

"Pat" is a British-made achine which has been de- igned for research work on e nature of human speech. The initials P. A. T. stand or "Parametric Artificial alker." This machine not on- creates sounds normally sed in speaking, but also rings them together produc- g the illusion of complete ords and phrases. It can, in ct, talk.

"Pat" was built to test a ypothesis about the nature speech sounds in their re- tion to telephone cables. Pat roves that speech can be ecified by signals which ange value quite slowly. hus, they can be sent over ery narrow bandwidth sig- alling channels which would a great economy.

It is hoped that bandwidth n be reduced by a factor 20 or 30 to 1 thus enabling or 30 times as many con- rsations on long-distance lephone links — such as the ans-Atlantic telephone cable.

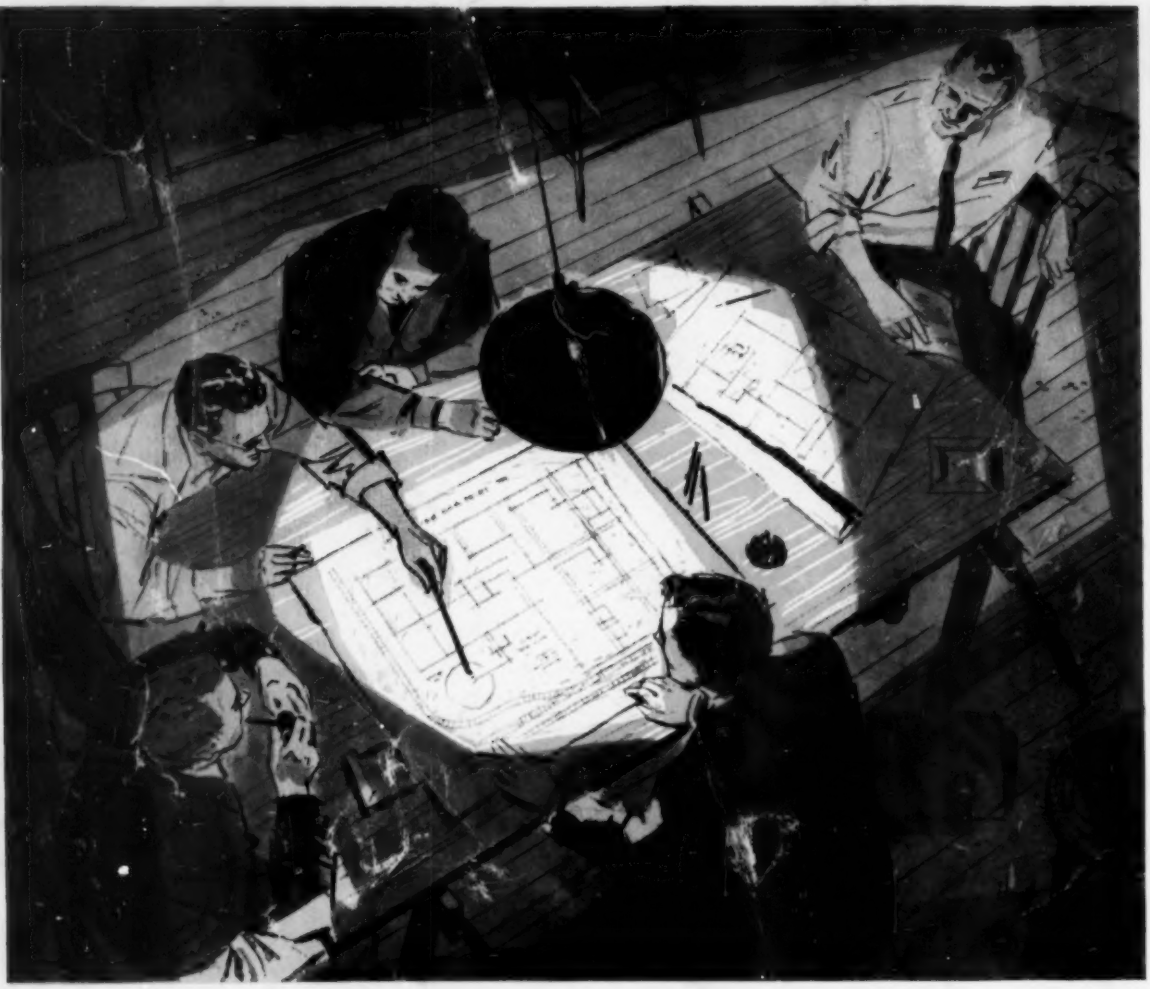
Powermaster®... FIRST WITH STEAM ATOMIZATION FOR LOW-COST NO. 6 OIL

Here's vital, dollars-and-cents news for the medium-sized user of process steam. Orr & Sembower has developed a new steam atomizing burner for POWERMASTER packaged automatic boilers that breaks down the heaviest #6 oils into clean-burning fog. You can save up to 2c or more per gallon by burning #6 oil instead of #5 oil . . . cut fuel bills $16,000 on an annual consumption of 800,000 gallons. The O&S steam atomizing burner is tailored for industries such as dairies, food and chemical processors, textile and metalworking plants. Available in complete POWERMASTER packaged boiler units from 40 hp to 600 hp and as a separate burner system. No comparable atomizing system for packaged fire tube boilers has been available before from any manufacturer. The new O&S burner gives freedom from operating difficulties to a degree never before experienced except in large, expensive field-erected boilers. The rugged burner has no moving parts to clog or wear, and steam scrubbing action keeps the nozzle clean. Cost? A steam atomizing POWERMASTER can pay for itself in less than two years. Know of any better plant investment? Frankly, we don't. Suggestion: Write, wire or phone us today for the complete story.

ORR & SEMBOWER, INC.
950 MORGANTOWN ROAD
READING, PA. • Since 1885

Powermaster PACKAGED AUTOMATIC BOILERS

Circle 9654 opposite covers.



We can give you valuable help

In designing, installing or converting water softening equipment

There's no charge for the services of one of Morton's Consulting Engineers at any stage of your work with water softening systems. Many architects and engineers have already found that calling in a Morton man can save time and work and will result in water softening installations that provide maximum efficiency and the greatest economy of operation.

The Morton Consulting Engineers have experience with all types of water softening systems for all types of uses. The assistance they offer is well worth an inquiry. If you think a Morton Consulting Engineer could be of assistance to you, just send in the coupon today.

I would like to know how a Morton Consulting Engineer could help me_____

I understand there is no charge for this service.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

MORTON SALT COMPANY

INDUSTRIAL DIVISION

Dept. PI-359, 110 No. Wacker Drive, Chicago 6, Ill.

Circle 9655 opposite covers.

POWER PLANT & POWER SERVICES INDUSTRY

Putman Publishing Company

CREATORS OF

READER ACTION MAGAZINES

. . . featuring all these essential elements:

- TERSE VITAL EDITORIAL
- HAND-PICKED CIRCULATION
- "EXECUTIVE" FORMAT
- HIGH VISIBILITY
- QUALITY READERSHIP
- MORE READER ACTION